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ANATOMIC DESCRIPTION OF A CASE OF MARGINAL PLACENTA PREVIA

WITH A DISCUSSION OF THE ETIOLOGIC IMPLICATIONS

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SINCE opportunities to study anatomically cases of placenta previa are very limited, it seems worth while to report the findings of a case which presented itself recently. The case in question is of interest not merely from the anatomic viewpoint but also because it embodies certain implications in regard to etiology, the frequency of the condition, and the cause of bleeding, none of which are exactly known at the present time.

CASE 1.—(No. 88252.) White, para v, aged forty years. Previous four pregnancies ended in full-term spontaneous deliveries without complications, in 1921, 1923, 1925, and 1927. Between the third and fourth pregnancies, she was curetted twice for bleeding, and may have had an abortion. Last menstrual period May 11, 1935. Estimated date of confinement Feb. 18, 1936. Patient entered the hospital Feb. 26, 1936, because of vaginal bleeding. She had registered in the prenatal clinic Jan. 18, 1936, a month short of term; she was seen at frequent intervals between then and hospital entry. Her course had been uneventful except for slight ankle edema. Pelvis normal, Wassermann negative, no significant physical findings except marked vaginal relaxation. On February 16, while preparing breakfast, patient suddenly felt blood trickling down her leg; no pain. About one-half glass dark red blood was passed. She went to bed immediately. During the next few days there was no further bleeding. On February 25, twenty-four hours before entry, an-

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other episode of spontaneous, painless bleeding occurred. A cupful of bright red blood containing a few clots was passed. Bleeding ceased when patient went to bed. Entered the hospital on following day.

Examination revealed no bleeding, mucous membranes of good color, blood pressure 120/86, temperature 37° C., pulse 90, respirations 20. The abdomen was distended by a term-sized fetus in L.O.A., head not engaged, fetal heart in L.L.Q., Hb. 65 per cent (S), R.B.C. 4.3 M, W.B.C. 10,200, blood group, Moss I, urine negative. The presumable diagnosis was placenta previa. No vaginal examination was made since it was felt that the patient's age, parity, the nonengagement of the head, and the desire to sterilize her indicated cesarean section as the best method of treatment, regardless of the degree of previa. When bleeding recurred in small quantity the following day, section was performed.

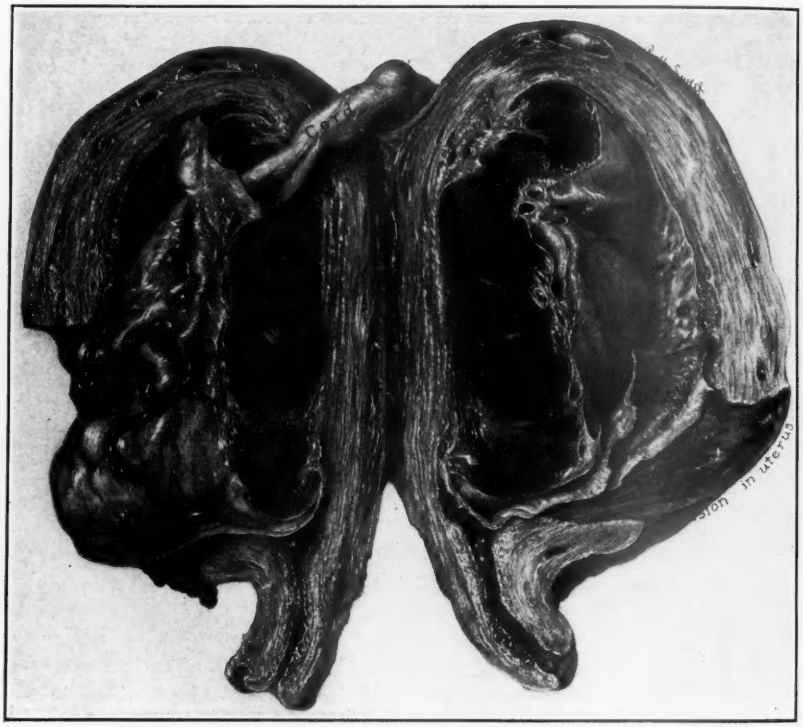


Fig. 1.—Fixed uterus opened sagittally in the midline. In this plane the placental margin is 2 cm. above the internal os. A circular sinus is present at the level of the internal os.

The vessels over the lower segment on the right side were more prominent than elsewhere, indicating probable implantation of the placenta in this region. Classical section was chosen in order to avoid these vessels. A normal female child weighing 3,670 gm. was delivered. In order to sterilize the patient and at the same time minimize the chance of infection, hysterectomy without removal of tubes or ovaries was chosen as the proper procedure. Before hysterectomy several sutures were placed to close the uterine incision, retaining the placenta in situ. Although it was planned to amputate through the lower portion of the cervix, the operator found that he had unintentionally opened the vaginal vault so that finally a total hysterectomy was done.

The patient made an uneventful recovery, the highest temperature being 38° C. on the second day. At discharge on the nineteenth postoperative day, her hemoglobin was 85 per cent, R.B.C. 4 M.

Description of Specimen.—(After fixation for twenty-four hours in 10 per cent formalin.) The specimen consisted of the entire uterus, including the cervix.

The uterus measured 21.5 cm. from tip of cervix to fundus, 16 cm. between tube portals, and 12 cm. in its greatest anteroposterior diameter. Low on the anterior wall was an 8 cm. incision held together by several sutures. The incision started 2 cm. above the level of the internal os and extended obliquely upward toward the

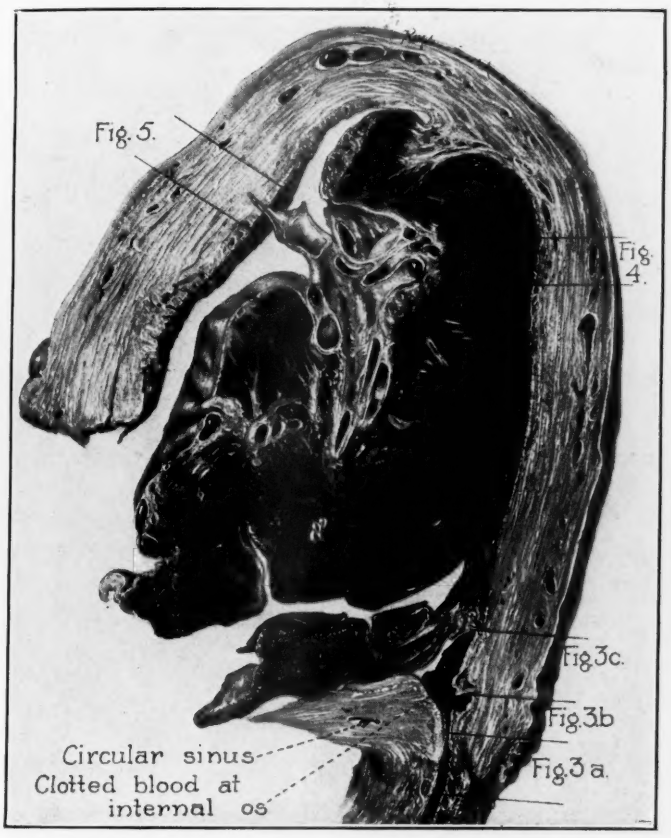
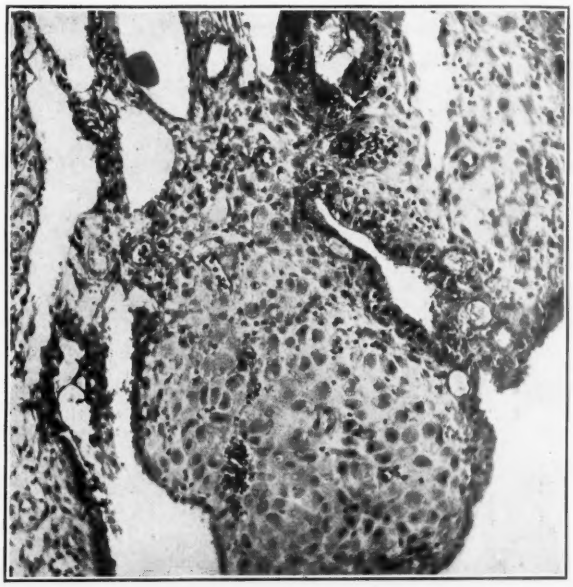


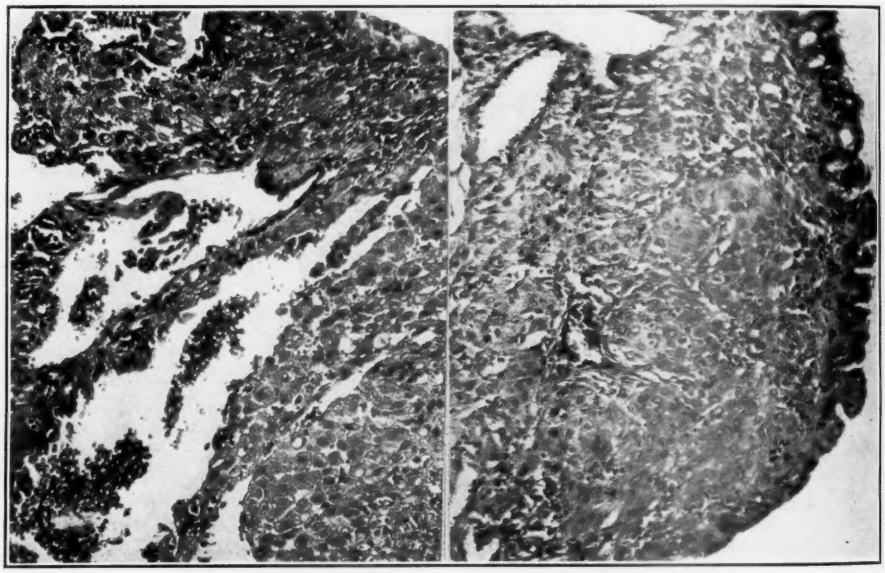
Fig. 2.—Segment cut sagittally 1.5 cm. to the right of the midline. The placental margin just reaches the internal os. Clotted blood is present in the upper part of the canal.

left cornu. From this incision protruded one margin of the placenta. The vessels on the anterior wall of the lower segment on the right side were much more prominent than elsewhere, indicating probable implantation of the placenta in this area. The cervical canal was intact, measuring 5 cm. from tip to internal os. On splitting the uterus in half in the sagittal plane (Fig. 1), the placenta was found implanted on the right posterolateral wall, so that about one-third remained in the left half of the uterus, two-thirds with cord attachment in the right half. A portion of the right margin of the placenta had already separated. The major portion remained attached. The lower margin of attachment in this plane was 2 cm. above

the internal os, the membranes being reflected over the os and up on to the anterior wall. There was a small amount of old clotted blood between the internal os and the reflected membranes as well as in the cervical canal proper. The upper margin



A.



B. *C.*

Fig. 3.—Sections showing decidua in cervix and lower segment. Areas from which these blocks were taken are indicated in Fig. 2. *A*, From middle of cervical canal. *B*, From upper part of cervical canal. *C*, From uterine wall just above internal os.

of attachment was on the posterior wall 13.5 cm. above the lower one. Two centimeters above the lower attachment the placenta was partially separated by blood

clot, otherwise it was uniformly attached (in this plane) by numerous membranous septa which divided this potential space into many varying sized sinuses, some as large as 2 cm. in diameter.

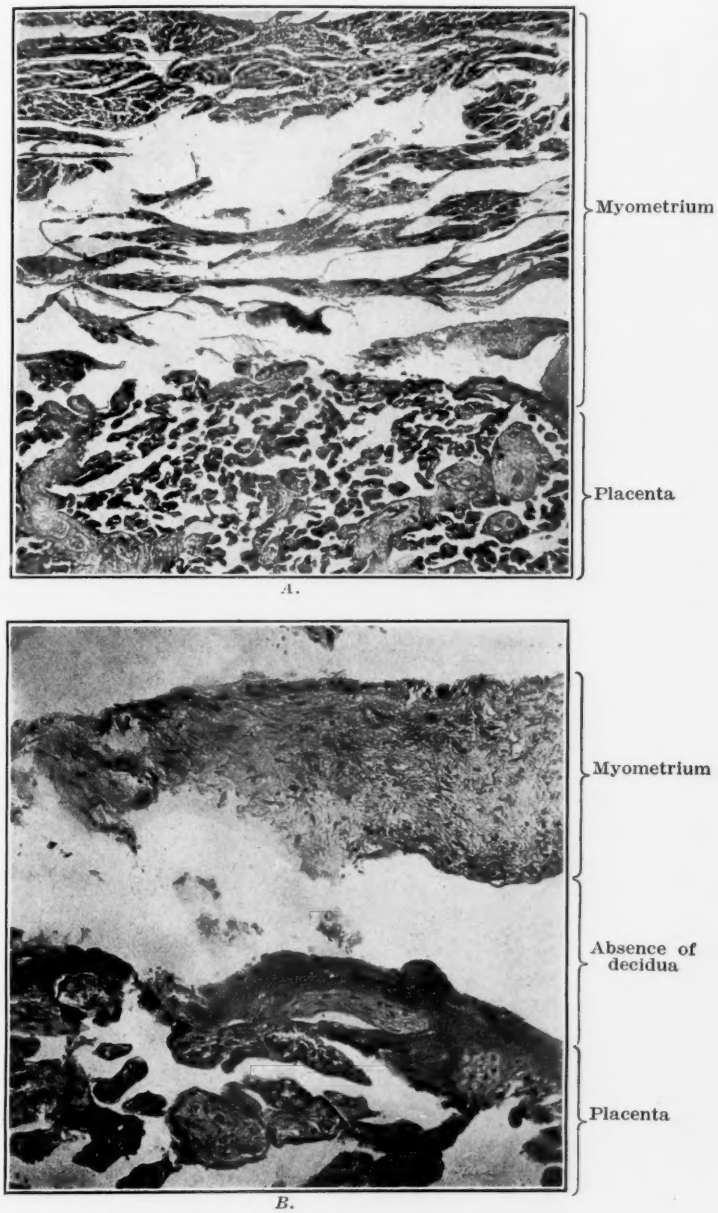
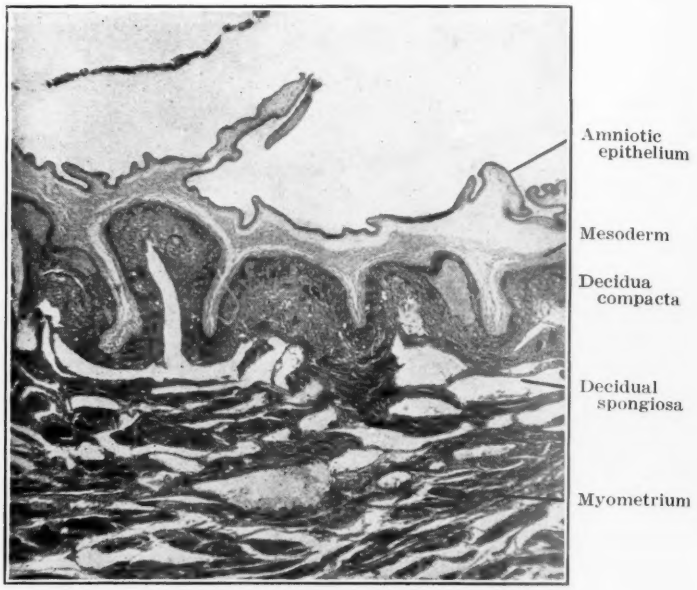


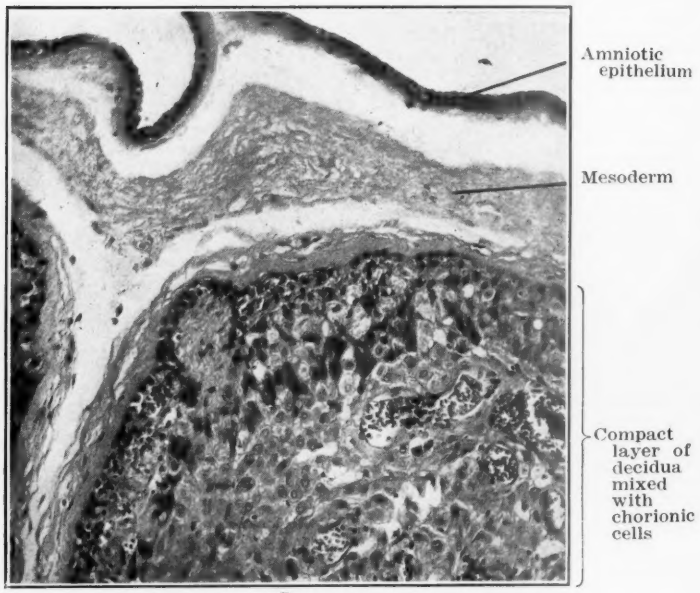
Fig. 4.—Section taken from a central point of the placental site. For exact location see Fig. 2. Illustrates the absence of decidua at a point where the amount normally is considerable. *A*, Low power; *B*, high power.

On elevating the lower border of the placenta in the right half, a margin of chorion frondosum was found extending from the right side just beyond the margin

of the internal os. No old blood clung to this area, nor did it appear depressed, although this would actually be impossible unless a clot of considerable size had



A.



B.

Fig. 5.—Sections showing decidua vera with membranes attached and thrown into numerous folds due to reduction in surface area incident to uterine contraction. Compact and spongy layers are well preserved. *A*, Low power; *B*, high power.

accumulated, since there was a cone-shaped space here which led into the cervical canal. The lower portion of this space *did* contain clotted blood. Fig. 2 represents

a slab cut sagittally just 1.5 cm. to the right of the midline and shows clearly the placental margin covering the rim of the internal os.

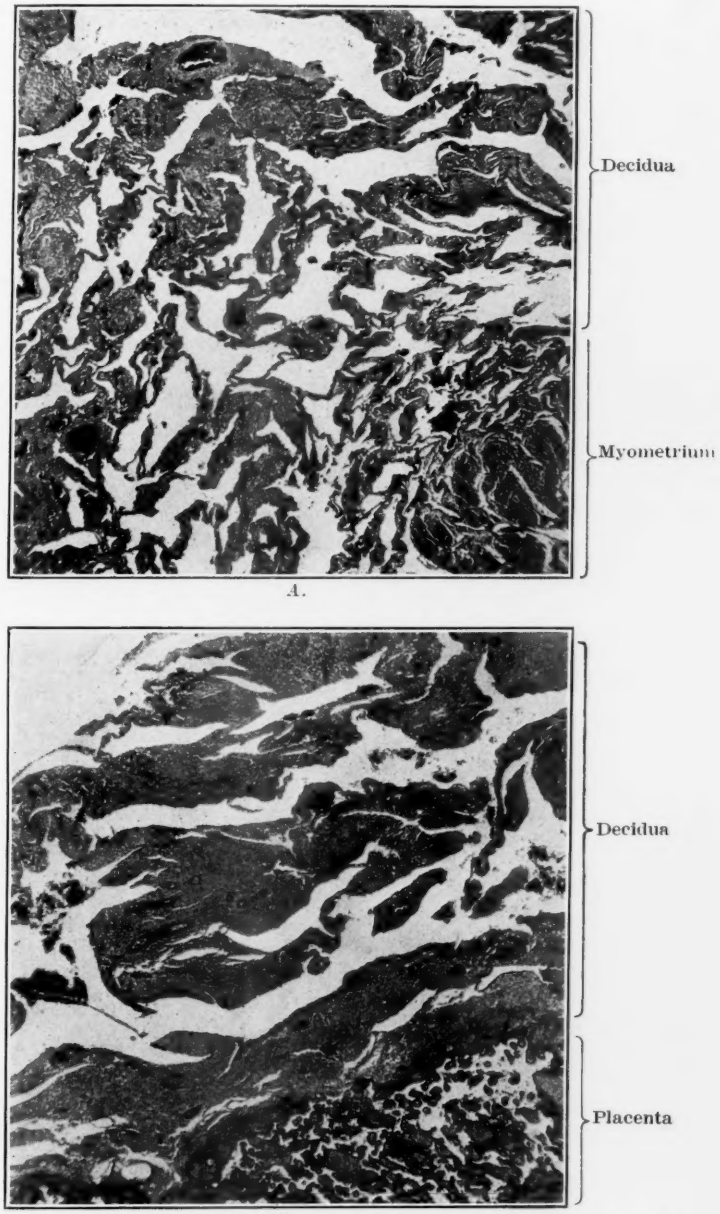


Fig. 6.—Relative abundance of decidua beneath term placenta normally. *A*, Low power. From placental site of puerperal uterus just after placental separation. *B*, Low power. Decidua attached to term placenta.

The anterior uterine wall was 2.75 cm. thick, the posterior wall 2 cm. Dilated vessels and sinuses were prominent in the wall. Those underlying the placental

site were larger and more numerous than elsewhere. A large circular sinus, 0.4 cm. in diameter, was situated in the middle of the wall at the level of the internal os. The decidua vera was distinguished as a flesh colored layer 0.75 cm. thick. With the membranes which remained adherent, it was thrown into many transverse folds. The decidua basalis was not distinguishable grossly as a definite layer. The inner one-fourth of the cervical wall was occupied by dilated cystic glands filled with mucus. The remainder of the inner half of the cervical wall was spongy and light in color. The outer half was darker, consisting of firm fibromuscular tissue.

Microscopic examination of blocks taken from the entire circumference of the uterine wall, in the sagittal plane, 1.5 cm. to the right of the midline, revealed several interesting findings. From the middle of the cervical canal upward to the placental margin, there was a distinct and quite well-marked decidual reaction (Fig. 3). Below this point the usual cervical structure was seen, the glands being dilated with mucus, the epithelium swollen. At the placental site the decidua was very scanty indeed. Fig. 4 is representative of the findings here, showing a section taken from the middle of the posterior wall, just above the central point of the placenta. The decidua here is represented by a lacy framework only, the spongy glandular layer. Almost nowhere in the basalis is the compact layer in evidence. In some areas even the spongiosa could not be made out (this, without placental separation). The decidua vera was much better preserved, both compact and spongy layers being clear and definite (Fig. 5). The intimate association of decidua vera and chorion laeve is well illustrated. This membrane, as well as the amnion, has been thrown into deep folds by the reduction in surface resulting from uterine contraction.

The placental tissue itself was normal in appearance, as was the cord. The most notable features microscopically are: (1) the large amount of decidual reaction in the cervical canal, and (2) the scantiness of decidua beneath the placenta higher up, where one would expect a marked decidual reaction.

DISCUSSION

I shall not enter into a prolonged discussion of the etiology of placenta previa, but I do wish to correlate the findings in this case with several interesting and pertinent observations which have been made in the past. No one knows what determines the site of implantation of a fertilized ovum. It is known that the usual site is well up on the posterior or anterior wall, sometimes more or less laterally, very rarely in the fundus, and quite infrequently in the region of the cervix. These facts are in keeping with the anatomy of the pregnant uterus, in that the walls of the contractile portion of the uterus are lined by a thick layer of decidua, soil which presumably is ideal for implantation of the fertilized ovum and certainly prepared especially for it, whereas the decidual reaction in the segment of the uterus just above the cervix is usually scanty, and in the cervix itself entirely absent. What part gravity may play in determining a site low in the uterus is unknown, but in general is considered an inadequate explanation, though it may play a part in some.

In 1902 Strassmann[1] made a valuable contribution when he contended that low implantation might occur because of previous disease of the endometrium, thus making it unsuitable, or at least insufficient, for

the needs of the placenta by leading to defective vascularization. As he pointed out, this condition is associated with increasing age and parity and is more frequent in those having had rapidly repeated pregnancies. That is, it is more common in women in whom there has been a greater possibility of endometrial infection.* All subsequent investigators have accepted Strassmann's view that previous endometritis or other abnormality of the endometrium plays an important rôle in the etiology of placenta previa. Although at the present time we do not recognize an endometritis which exists from month to month and year to year without causing definite symptoms, it is conceivable and probably true that permanent changes often *follow* endometrial infection or even pregnancy without succeeding infection. Many vessels become thrombotic at this time, thus diminishing the available vascular bed. With increasing age and parity these vascular changes with the accompanying fibrosis may become so widespread as to reach a point of paramount importance. It is certainly a common experience to find the uteri of older women, who have had numerous pregnancies, large, fibrotic, and containing many thrombosed vessels, conditions quite distinct from those found in the uteri of nulliparous women of the same age. Recently an interesting experiment was reported by Solomons and Canter.[2] Working with rabbits, they traumatized the lining of one horn of the uterus by passing a needle through it. Pregnancy was then allowed to occur. It rarely did so in the injured horn. If only a portion of a horn was injured, pregnancy often took place in the uninjured, but not in the injured portion. The theoretical observations of Strassmann and the experiments quoted suggest that the fertilized ovum attempts to find better soil if the lining of the corpus has been injured, inflamed, or has developed defectively for one reason or another.

Even after the placenta has located itself, it may spread out over a larger area if for some reason the soil is inadequate. It is well known that placentas from cases of placenta previa are frequently very extensive in area, though they may be quite thin. A particularly good example of this is illustrated in the specimen described by Thompson[3] in 1921 which shows a central placenta previa, in which the placenta covers almost four-fifths of the uterine cavity; the entire placenta is below the insertion of the cord which is attached through the membranes and presumably indicates the original point of nidation. Further evidence of the placenta's ability to spread out is contained in Goodall's[4] recent study of circumvallation of the placenta. He showed quite clearly how the placenta extends beyond its ordinary margins when there has been infarction or sclerosis, presumably as a compensatory mechanism. He further pointed out that the extension is opposite the area of infarction. To my mind, these observations furnish adequate proof of the placenta's ability to extend. Whether it be because of a defective soil,

or disease of the placenta itself, nature's effort appears to be the same, i.e., to obtain adequate vascular connections for the placenta and fetus. Whenever the placenta does extend, the likelihood of the development of a previa becomes increased.

An entirely different mechanism was described by Hofmeier[5] who showed definitely that *some* cases of placenta previa are due to a persistence of cotyledonous development on the capsularis or reflexa, the so-called reflexa placenta previa. When the capsularis has been carried out to the decidua vera and become fused with it, that portion having persistent villi may bridge the internal os; if the villi continue to develop, a definite previa will exist. This observation has been confirmed many times. However, as he himself admitted, this is only one cause of the condition. A number of definite cases of serotinal placenta previa have been described. The case described by Titus and Andrews[6] in 1924 is a particularly good example of the serotinal variety.

Unfortunately the specimens which have been described have not been studied microscopically as thoroughly as they might have been, thus detailed information regarding the decidua is lacking. In my specimen, very striking features are the scantiness of the decidua basalis, and an abundance of decidual reaction in the cervix, suggesting that the cause of the condition was a defective decidua high in the uterus, a relative abundance low in the uterus. The amount of decidua beneath a term placenta, normally, is variable and may be quite scanty. However, in three term uteri removed at cesarean section, even after removal of the placenta, the amount of decidua at the placental site was definitely greater than that found beneath the still attached placenta of the case under discussion. Further, quite a considerable quantity of decidua can usually be distinguished microscopically in sections of term placentas (Fig. 6). Therefore, I believe that the observed findings furnish a distinct departure from the normal. The association of these findings with a placenta previa fits in with the theory of Strassmann, and tends to prove it a fundamental consideration in the etiology of this condition.

Study of this specimen also leads one to ponder the question of the frequency of placenta previa. Definitions of what constitutes a placenta previa vary. We speak of the central, partial or lateral, and marginal varieties—some designate these with respect to the undilated cervix, others with respect to the completely dilated cervix. It is obvious that as retraction and dilatation proceed, the relations of the placental margin and the opening in the uterus will change. Probably one should designate all cases as placenta previa in which the placental attachment is low enough in the uterus, so that obliteration of the cervical canal and dilatation of the os may cause some separation. A little reflection makes it evident, however, that in certain cases of lateral, or marginal placenta previa, in which the margin of the placenta does *not* reach the margin

of the internal os before dilatation has been completed, separation and bleeding may not always be produced. On the contrary, in some instances of antepartum bleeding, one may not be able to feel the placental margin, yet actually bleeding may be due to separation of a placenta so low in the lower segment that it has been caused by alterations in the cervix. I am inclined to think that this happens often. For these reasons, it is practically impossible to estimate the true frequency of the condition. It may be present anatomically, but not manifest itself clinically; it may cause bleeding, yet be diagnosed premature separation of a normally implanted placenta. These facts must be borne in mind in considering any statistical study of these two conditions; we may make very erroneous deductions as to morbidity, mortality and the like.

Indeed, in an attempt to study statistically the 127 cases of antepartum bleeding, not definitely due to some cause (such as cervical erosion) other than placental separation, which occurred in this Clinic in the fifteen-year period 1920 to 1935, I was unable to divide them definitely into cases of placenta previa and premature separation of the normally implanted placenta. It was necessary to group them as cases of definite placenta previa, demonstrated by vaginal examination and the subsequently revealed pathology (35 cases); definite premature separation as demonstrated by the absence of previa on vaginal examination, and the presence of a depressed area on the placenta (28 cases); presumable premature separation, previa being ruled out by vaginal examination, yet placental pathology being absent and hemorrhage slight (33 cases); and finally a group of frankly unexplained cases—unexplained because bleeding was slight, the patients were not examined vaginally, merely treated expectantly, with the result that bleeding ceased, uncomplicated delivery occurred, and the placenta failed to show evidences of premature separation of any type (31 cases). Therefore it seems to me impossible to consider these two conditions apart, except for the extremes, in which we have either the placenta quite patently covering the internal os, or the Couvelaire type of separation.

Concerning the production of bleeding: it is clear that if the placenta actually covers the internal os, or a part of it, as the opening becomes enlarged or retracted the attachments of the placenta are bound to be torn through, and bleeding occur. Should the placental margin merely approach the internal os, the mechanism by which bleeding is produced is not so clear. The mechanism is intimately bound up with the dilatation of the cervix and the formation of the lower uterine segment. As that portion of the cervix above the external os becomes pulled up to become incorporated in the lower portion of the uterine wall, it seems rather obvious on contemplation of the relations as illustrated in Fig. 1, that there is bound to be a shift in the layers composing the wall in this area which would often be sufficient to cause detachment of the placenta

should a portion of it be implanted in this region. How far upward from the internal os this shift occurs is a matter of conjecture. How, then, may we explain the bleeding which often occurs in such cases before the onset of labor?

It has long been considered by many authorities that the cervix is not "taken up" in the latter part of pregnancy, before the onset of labor, to become a part of the lower segment. Webster[7] so states in his textbook, and further adds that, therefore, this has nothing to do with the cause of bleeding before labor in cases of marginal or lateral placenta previa. More recent authors do not discuss the point in detail, simply state that bleeding before labor is caused by the painless contractions of the uterus. This is an insufficient explanation. Such contractions could not well be responsible except so far as they may produce changes in the lower segment and cervix, since otherwise the normally placed placenta would frequently become detached, not only by the painless contractions, but also by the much more violent contractions of labor, events which we know rarely occur. As a matter of fact, we have concrete evidence that the point of view expressed by Webster is incorrect and that alterations in cervix and lower segment often do occur before labor sets in. On vaginal examination at or near term, before the onset of painful contractions, the cervix is found to vary markedly; in some, the canal is intact, the cervix at least 4 to 5 cm. in length and quite tightly closed. In these it is evident that little, if any, change has occurred, the cervix has not become incorporated in the lower segment before the onset of labor. If these women go into labor, and we have often put them in labor by rupturing the membranes, the process is usually a long one, since a variable number of hours (eight to twelve) is occupied in obliterating the canal. Little or no dilatation of the external os occurs until after obliteration has taken place. In such women one would not expect bleeding to occur until the onset of labor even if the placenta were situated low in the uterus. In other women, vaginal examination reveals that the canal has already been obliterated before the onset of painful contractions; the margins are thin, the external os is partially dilated, sometimes 2 to 3 cm. In these women, labor is invariably much shorter in the absence of other complicating conditions. The reason is that much of the work has already been done; when labor pains set in, they result immediately in dilatation. Again this has been confirmed by experiences in inducing labor under such circumstances. In these women, should a placenta previa exist, one would certainly expect bleeding to occur before the onset of labor. Naturally there are all gradations between these two extremes, women in whom more or less obliteration of the canal, or "taking up" of the cervix has occurred before the onset of labor.

These facts allow of no other explanation than that the cervix very often *does* become a part of the lower segment before the onset of labor.

Further I believe that this offers a reasonable explanation for the production of antepartum bleeding due to placenta previa, both before labor sets in and after. That it might not be the sole cause is readily admitted.

One further observation in this specimen is of interest. It will be seen in Fig. 1 that there is a large circular sinus encircling the cervix *at the level of the internal os.* This sinus is probably that which is found dividing the upper and lower segments late in labor. The observation suggests that only the cervix enters into the formation of the lower uterine segment. Bandl's explanation is not generally accepted today, nevertheless I feel that the matter is not a settled one. Certainly the presence of decidua below the retraction ring cannot be regarded as proof of the double origin of the lower segment, for one may find decidua even well down in the cervical canal as illustrated in this case.

SUMMARY

An anatomic description of a case of marginal placenta previa is presented. Interesting findings were: marked scarcity of decidua beneath the placenta, relatively profuse decidual reaction in the cervix and lower uterus, and presence of a circular sinus at the level of the internal os. The implications of these findings regarding etiology, frequency, the cause of bleeding, and the lower uterine segment are discussed.

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VENTROSUSPENSION OF THE UTERUS WITH LIVING SUTURES

A Preliminary Report

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ALTHOUGH nonoperative treatment of retroversion of the uterus is the method of choice in appropriate cases, there is still that large group in which only surgical means of correction can ever bring dependable help. Intraperitoneal operations for mechanical suspension of the uterus by means of utilizing the round ligaments are so numerous, that a balanced consideration of the subject and final conclusions are nearly impossible. It is fair to state, however, that because of familiarity with technic and a satisfactory degree of success in a large series of cases

surgeons are much too inclined to use favorite methods routinely. Most gynecologists have been intensely critical of this attitude and emphasize the necessity for classification of the pathology and individual adaption based on sound reasoning before deciding on the choice of procedure to be followed. Such judgment depends for the most part upon a knowledge of normal anatomic relations of the pelvic adnexa and their complete restitution, rather than any ability to diagnose obvious malposition of the uterus.

In deciding upon the method of suspension to be used in the young or middle-aged individual, there are three well-accepted criteria. First, the resulting correction must equal normal position and be permanent. Second, there should be no danger of bowel becoming interposed. Third, under stress of childbearing, there should be no interference with the development of the uterus during pregnancy or dystocia with the onset of labor. In satisfying these requirements, some type of fixation of the round ligaments with or without intraperitoneal shortening seems to have the approval of the majority of surgeons. In the author's experience, either the Olshausen or the Simpson-Crossen modifications of the Gilliam operation with shortening of the uterosacral ligaments presents a means of holding the uterus in normal anatomic position without distortion of the adnexa and the above-mentioned complications are certainly remote.

As the basic technic of these procedures is familiar, the various minor modifications will be eliminated in this paper in order to avoid much sameness. Therefore, standard technic is referred to in the following description.

The Olshausen operation provides for a firm intraperitoneal fixation of the round ligaments against the peritoneum of the anterior abdominal wall by means of sutures which pass deeply into the fascial and muscular layers. Silk, linen, kangaroo tendon, and even silkworm gut have been used in order to obtain a firm fixation and in the majority of cases have proved satisfactory. Such nonabsorbable materials usually remain intact through fibrous inclusion, but in the occasional patient infection invades and the result is nothing short of discouraging. Although direct communication of the infection to peritoneum through the suture canals is a rare happening, nevertheless when it does occur the surgeon is thereafter willing to place his trust in catgut exclusively. It is especially characteristic of nonabsorbable materials to delay the immediate formation of early fibrinous adhesions which are so necessary to seal the suture canals. Consequently, in the presence of an early virulent infection there is always danger of peritonitis. Catgut, on the other hand, is likely to undergo absorption in the presence of either early or late infection with weakening of the points of fixation. Actual rupture, with either one-sided torsion or a return of the uterus to retroposition,

then occurs and further chronic invalidism of a worse sort results. Such accidents invariably bring condemnation to a favorite suture material, and then begins the usual search for something better.

The Gilliam operation including various modifications is somewhat different with respect to dangers from infection or rupture of sutures in that the ligaments are drawn through the abdominal wall and fixed extraperitoneally in the parietes. Formation of early fibrinous adhesions between the coapted tissues is therefore immediate and assured as conditions are more strictly histologic. Moreover the ultimate fate of the suture whether nonabsorbable material or catgut is not nearly so important as it is extraperitoneal. Peritonitis is virtually impossible and the worst that can happen is an encysted abscess around the suture with sloughing and discharge of the suture from the wound. The latter has been so common with nonabsorbable materials in both the Olshausen or Gilliam operations that forty-day chromic catgut is now almost universally employed. Foreign body irritation does predispose to infection, and therefore it is reasonable to assume that in the so-called clean cases a mild degree of infection always exists but disappears through resolution and never becomes evident.

In reviewing the literature on uterine suspension, one finds that the matter of correct methods of suturing the round ligaments and the relative merits of the materials to be used are given great attention. This would indicate that any of the materials thus far tried have given some degree of satisfaction, but still leave something to be desired. Having had a proportionate share of disappointing cases due to rupture of sutures and to sepsis, the author became interested in the possibility of using living fixation sutures to substitute for older methods. The results obtained with living sutures have been sufficiently gratifying to risk a somewhat premature report of a small series of cases.

Strips of fascia from the anterior rectus sheath 3/8 of an inch wide have been used rather than fascia lata both because of ease of handling and avoidance of unsightly thigh scar. That fascia as suture material becomes permanently imbedded, is unyielding and readily invests itself into fibromuscular structures is now an established fact and therefore should be ideal suture material for this purpose.

Both the standard Olshausen and Gilliam types of round ligament fixation have been tried with minor variations only in the cutting and handling of the suture itself. Many such variations are, of course, possible. The following method to be described has been used in the author's patients so far done.

OPERATION (OLSHAUSEN) WITH FASCIAL SUTURES

The skin and fat layers of the abdomen are incised through a Pfannenstiel incision down to the fascial sheaths of both recti muscles. These layers are grasped together and by means of gauze dissection and sweeping strokes of the knife are

reflected upward, exposing a large area of both rectus sheaths. The skin and fat apron is then retracted forcibly upward. Starting as high as possible at the lateral border of the recti muscles on each side, two strips of full thickness fascia approximately ⅜ of an inch wide and 3 inches long are cut from above downward following the outer border of the muscle. This will result in a slight convergence of the strips inward at the pubis as the muscle borders curve inward at this point (Fig. 1). This leaves a narrow point of attachment of the fascia to the pubis in the interspace between the strips. The fascia is here cut across transversely (indicated by dotted line Fig. 1) and the middle fascial apron is reflected off the muscles upward completely denuding the lower central area.

The recti muscles are then separated in the midline in the usual manner and the peritoneal cavity entered. With wide retraction this incision allows adequate exposure of the pelvic adnexa for any additional surgical treatment.

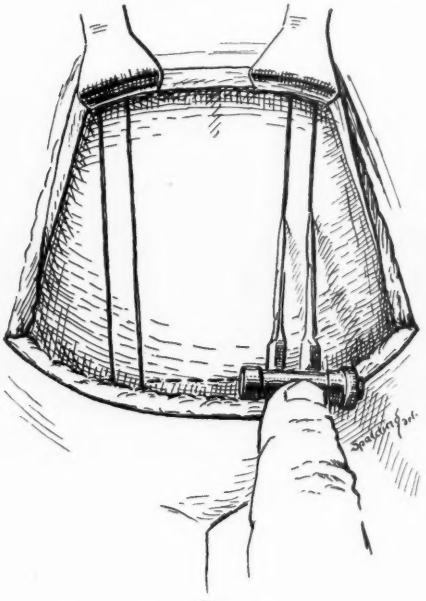

Fig. 1.

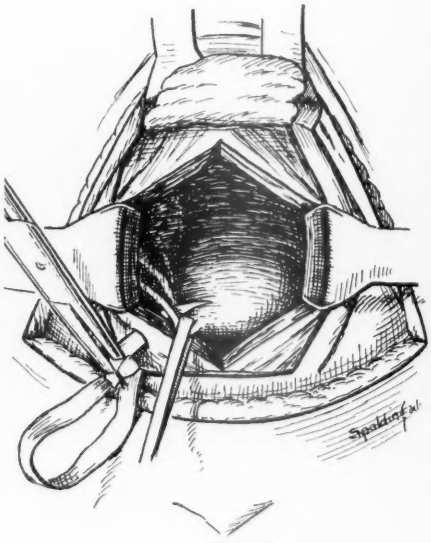

Fig. 2.

Fig. 1.—High retraction exposes large area of rectus sheath. Full thickness strips of fascia cut from above downward following outer border of muscle. Transverse dotted line represents location where fascial apron is cut across in order that it may be reflected upward.

Fig. 2.—Fascial strip has been detached above but left attached below and free end threaded into fascia needle. Needle is carried through abdominal parietes and round ligament is picked up in the usual manner. Strip on opposite side remains in situ until needed for use.

The uterus is then drawn up from the retroposition and the round ligaments grasped one inch from the uterine attachments by means of Allis forceps and held taut. The previously prepared fascial strip on one side is then severed at its upper attachment and with a few sweeping strokes of the knife is dissected off the muscle down to the pubic end where it is left attached. The free end is threaded into a special fascia needle, overlapped upon itself and tied securely with linen (Gallie method).

The needle is then passed through the midportion of the muscle at the desired level perforating the underlying peritoneum to enter the abdominal cavity, when the strip of fascia is drawn through. The round ligament is then picked up beneath

the Allis forceps in the usual manner (Fig. 2). The needle is then carried through the abdominal layers again in the reverse manner just medial to and at the same level as the point of entrance. The strip is pulled taut to approximate the ligament to the anterior abdominal wall (Fig. 3). The strip is fixed upon itself near the pubic attachment after the method of Gallie.

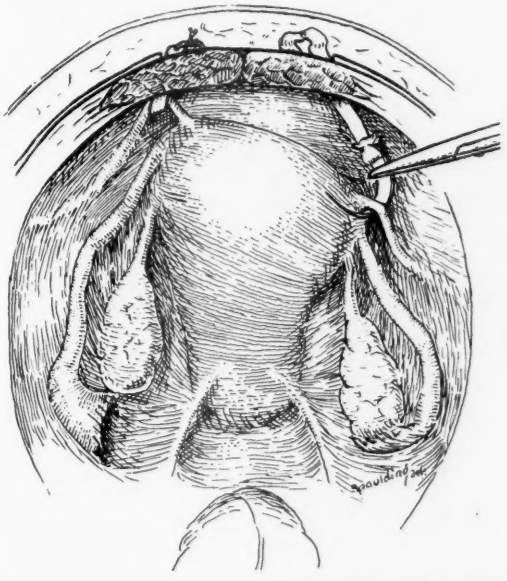

Fig. 3.—Needle and strip have been carried through abdominal parietes in the reverse manner drawing round ligament flush to anterior peritoneum. Strip is fixed upon itself at the pubic attachment. Opposite side illustrates strip being drawn through and round ligament being picked up with fascia needle.

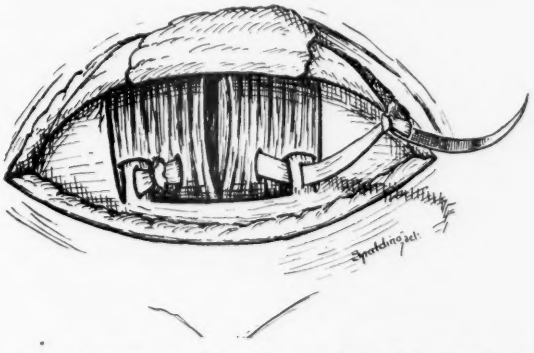

Fig. 4.—Right side anchorage complete. On the left, strip has been drawn through itself in preparation for anchorage (Gallie method).

This maneuver is repeated on the opposite side which completes the operation of Olshausen's round ligament fixation with living sutures (Fig. 4). The peritoneum is closed tightly. The fascial apron is replaced, sutured transversely to its pubic attachment and closed with a running suture on both sides (Fig. 5). The slightly added tension of fascia from approximating the lateral incisions produces excellent coaptation of the recti muscles and thoroughly covers both anchorage points of the fascial suture on the lower anterior muscle.

OPERATION (GILLIAM) WITH FASCIAL SUTURES

The Gilliam method needs no extended technical description. Incisional approach is the same as above (Pfannenstiel) with preparation of the strips identical. The uterus is drawn up into correct position by means of drawing the round ligaments through the abdominal wall for extraperitoneal fixation. The actual use of fascial suture consists in merely picking up the loop of ligament where it comes through above the outer border of the rectus muscle and anchoring the free end through itself at its pubic attachment (Gallie method).

The ligament in this case is held by a loop of fascia, the anchorage of which is at the firm pubic attachment and for purposes of description can be likened to the links of a chain. This living suture eventually forms an extraperitoneal, tendinous, accessory ligament. Here, caution must be used not to leave the fascial loop too long as the round ligament may then recede into the abdomen and allow the uterus to hang loosely. In the few Gilliam type operations that have so far been

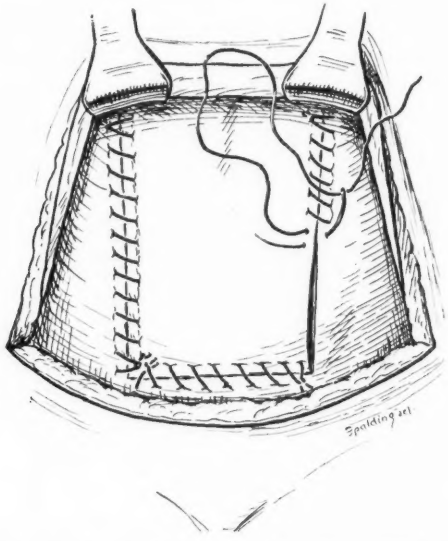

Fig. 5.—Peritoneum has been closed, fascial apron replaced over muscles and sutured transversely to its pubic attachment. Lateral leaves of fascia closed with running suture approximating muscles.

done, it has seemed advisable to pull taut on the suture until the round ligament just barely appears at a level with the anterior surface at the outer border of the rectus muscle. This will approximate the uterus to the abdominal wall correctly.

PRELIMINARY REPORT OF CASES

In all, 27 patients ranging in age from twenty-three to forty-one years have been operated upon and had the Olshausen type round ligament fixation done with fascial sutures. Four were done for virginal retroversion uteri and 23 for varying degrees of procidentia in which vaginal plastic repair of one type or another was combined. Pregnancy has intervened in one of the virginal cases and 5 procidentias. These six patients went to term with no untoward symptoms during the carrying

period; 5 were observed and delivered personally by the author and one by a hospital interne. Low forceps and episiotomy was the method of completing the second stage in all. None of these patients had difficulty in labor and their postpartum convalescence was normal. Subsequent observation showed involution to be unretarded and that the uterus was maintained in erect position.

It is now over five years since the first patient was operated upon by this method and delivered of a full-term child; recent examination of this patient showed the uterus to be held in erect position, adnexa normal, and she states that her general health has been excellent. There have been no second pregnancies so far in this small series.

As suggested in the above title, this report is distinctly preliminary as definite conclusions are not justified on such a small experience. The operation has only been tried in the occasional selected case in order to ascertain the logic of the mechanics and draw comparisons with a larger experience in orthodox procedures.

COMMENT AND CONCLUSION

It is apparent from the operative description and illustrations that in principle there is practically no variation from the usual Olshausen technic except that the fascial suture is fixed on the anterior surface of the muscle and covered by rectus sheath; it might easily be drawn through the sheath and fixed on the anterior surface in the orthodox manner, but this is obviously unnecessary.

By using living suture a permanent tendinous band is established which invested in peritoneum, muscle, and fascia acts as an accessory ligament. The round ligament instead of being held precariously to a loose and elastic peritoneum by adhesive fixation alone, is anchored permanently to an unyielding abdominal parietes at the desired level. Within a few hours the suture channels are sealed with fibrinous exudate and in seventy-two hours fibroelastic invasion has begun.

Meticulous care should be used in the tieing off of all small vessels before closing the sheath of the recti muscles, as a moist wound delays healing of the layers and predisposes to late sepsis. Should there be an uncontrollable capillary bleeding, it is advisable to insert a rubber drain in the midportion of the incision. This drain can usually be removed within forty-eight hours.

Postoperative incisional hernia is as unlikely in this approach to the pelvis as when the classical Pfannenstiel incision is used. Provided there are no postoperative complications and the incision heals by first intention, the hospital convalescence can be held to a maximum of ten days.

The Olshausen method is to be preferred to the Gilliam because of simplicity in technic, lessened painful tension of the round ligaments postoperatively, and a more complete assurance against dystocia.

This operation will be used by me with increasing frequency until a sufficiently large number of cases are collected when a further and more critical report will be made. In the interim, it is recommended as thoroughly safe for gynecologic surgeons to use and a fair trial by other surgeons with evaluation of the results should prove interesting and profitable.

SUMMARY

1. A new technic of performing Olshausen's round ligament ventrosuspension of the uterus through the use of living sutures is presented.

2. A constant large percentage of failures in maintaining position of the uterus together with the frequency of sepsis through the use of foreign suture materials, justifies trial of the method.

3. Later a more complete and critical report of results in a larger series of cases will follow this publication.

45 Bay State Road

A REVIEW OF SEVENTEEN CASES OF INTERESTING ANOMALIES OF THE FEMALE GENITAL TRACT*

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ANY consideration of anomalous structures may well be prefaced by a brief review of the embryology of the system involved. This is done because, as a rule, the cause of the anomaly is not known, and it is necessary to hearken back to the embryologic anlage from whence it arose in order to find the excuse for its existence.

In the 10 mm. embryo a mass of epithelium arises from the celomic epithelium of the lateral surface of the urogenital fold in the region of the third thoracic segment. This mass of cells becomes invaginated and forms a groove; the margins of the lips of this groove fuse at the caudal end to form a tube with an open cranial end. This is the primitive müllerian duct. The caudal end of this tube grows downward along the urogenital fold and as it grows caudad, it crosses the ventral surface of the mesonephritic duct and meets its fellow from the opposite side in the genital cord, and together they pass to the dorsal wall of the urogenital sinus. The adjacent termini fuse during the second month to form a single tube, the uterovaginal primordium, which in the third month opens into the urogenital sinus on a small eminence, Müller's tubercle. The open end of the müllerian duct develops a series of pro-

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jections, the fimbria. The paired portions of the müllerian ducts form the fallopian tubes. The cranial end of the uterovaginal canal develops into the fundus of the uterus, the middle portion develops into the cervix, and the caudal end becomes the vagina (Jordan and Kindred).[8]

The origin of the lower third of the vagina is a debated question and one that apparently is open to considerable controversy.

Vilas expressed the opinion that the perforation between the sinus urogenitalis and the uterovaginal canal at the müllerian tubercle does not take place. She said that the connection between these two structures is maintained by paired parallel thickenings of the walls of the uterovaginal canal, which she called the "müllerian swellings." The epithelium of the sinus urogenitalis grows between the wolffian ducts and the side walls of the uterovaginal canal and finally fills up the space occupied by the müllerian swellings. This paired proliferation of cells meets in the midline to form an epithelial mass, which Vilas called the "sinus epithelium." At the same time the walls of the uterovaginal canal proliferate anteriorly and posteriorly to form a solid epithelial plate which Vilas called the "müllerian epithelial

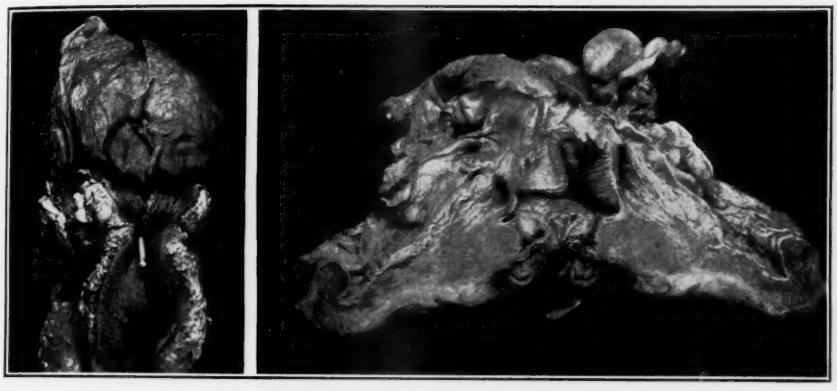

Fig. 1.—Anomalies of the tubes, uterus and vagina (after Kaufmann).

plate." Thus, the vaginal anlage consists of two portions, the cranial müllerian epithelial plate and the caudal sinus epithelial plate. At the end of the sixth month, the müllerian epithelial plate cannot be seen, and the vaginal anlage consists entirely of the remaining portion. The cells of this caudal portion become large, pale, and arranged in whorls. The central cells then degenerate and there arises a central cavity which is lined by squamous epithelium.

There are a number of theories as to the origin of uterine abnormalities; perhaps the very number of these theories is sufficient evidence that proof of the genesis of such abnormalities is lacking. The current theories may be roughly grouped to include: (1) antecedent and coincident cloacal and intestinal anomalies, (2) primary anomalies of the trunk or pelvis, (3) tumors, (4) abnormal fusion of the müllerian ducts or failure of absorption of the septum. Among those who considered that the intestinal anomalies were primary was von Winkel,[26] who believed that disturbances of development of the intestinal tract, bladder, or a cystic allantois will lead to anomalies of the uterus.

Kermauner[10] believed that a persistence of the cloaca is an important factor, while Felix[5] expressed the opinion that formative disturbances of the intestinal tract and developmental errors of the ventral abdominal wall are elements which contribute to uterine abnormalities. The theory of a primary trunk or pelvic defect was supported by Pfannenstiel[18] who said that a primary broader anlage of the lower part of the trunk might cause a failure of union of the müllerian ducts. Variants of this theory are those formulated by R. Meyer[15] and by Kussmaul.[12] R. Meyer maintained that uterine abnormalities are caused by too great a separation of the ilio-inguino-diaphragmatic ligaments or a shortening of the round ligaments which might cause a torsion and separation of the müllerian ducts. Kussmaul expressed the opinion that the persistence of the rectovesical ligament, which is seen in cases of uterus didelphys, keeps the lower ends of these ducts from uniting.

The outstanding champion of the separation of the müllerian ducts by the growth of a tumor is Pick.[20, 21] He expressed the opinion that stray cells of müllerian tissue or a tumor anlage may keep the ducts apart. C. W. Anderson,[2] in 1931, put forth a new theory which has certain interesting features. According to his theory, premature fusion of the müllerian ducts results in uterus rudimentaris solidus duplex with absence of the vagina; delayed fusion of these ducts results in uterus unicornus with one rudimentary horn, partial fusion of these ducts results in uterus bicornis with either one or two cervices, failure of fusion of these ducts results in uterus didelphys, and failure of fusion of the mesenchyme after fusion of the müllerian ducts gives rise to uterus infantalis.

The classification of anomalies of the tubes, uterus, and vagina (Fig. 1) is necessarily as complex as are the theories as to their origin. For simplicity and ease of understanding the schema outlined in Kaufmann's *Spezielle Pathologische Anatomie* is probably the best. A slight modification of this is given in Table I.

TABLE I. UTERINE ANOMALIES

I. Simple reduplication
  A. Incomplete joining of Müller's ducts
    1. Symmetrical false reduplication: uterus didelphys
  B. Complete joining of Müller's ducts
    1. External junction with persistence of the partition: uterus septus duplex

II. Rudimentary development
  A. Aplasia
    1. Incomplete development of both sides (symmetrical)
      a. Absence of tubes, uterus or vagina
        (1) Absence of uterus
        (2) Absence of parts of uterus or vagina
    2. Incomplete development of one side (asymmetrical)
      a. Absence of one side of uterus: uterus unicornis
  B. Hypoplasia
    1. Symmetrical or asymmetrical development with hypoplasia of one or more parts

III. Atresia of vagina, cervix, or fundus of uterus

MATERIAL

Material for this study consists of a group of seventeen cases in which the patients came to necropsy. This group includes a wide variety of abnormalities and will be presented roughly in the order noted in Table I.

Fig. 2.—Uterus didelphys in Case 1.

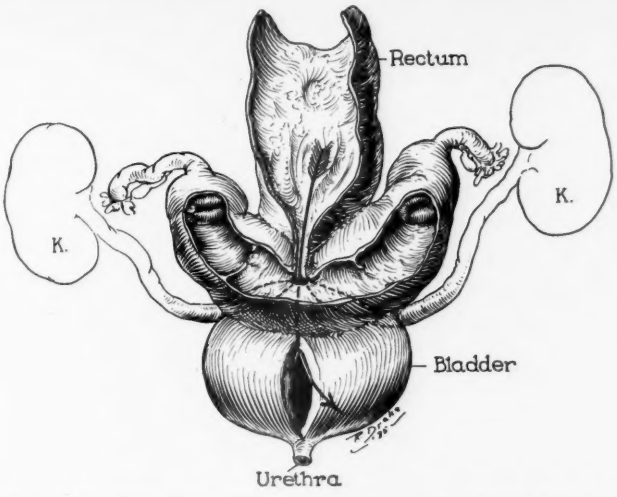

Fig. 3.—Sketch of genitourinary anomalies found in Case 2.

Simple Symmetrical Reduplication (Group I A 1).—CASE 1.—The patient was a married white woman who was forty-four years of age. Her menses had started at the age of fourteen years, had recurred every three weeks and had lasted seven days. She had never had any children. Necropsy revealed a uterus didelphys and a vaginal septum (Fig. 2). No other abnormality was noted.

CASE 2.—The patient was an infant, aged three days, who had no siblings. At necropsy a uterus didelphys was found. Other abnormalities included imperforate anus, esophagotracheal fistula, vesicorectal fistula with imperforate vagina (Fig. 3), perforated interventricular septum, accessory suprarenal gland, and accessory pancreas in the stomach.

CASE 3.—A girl, aged four years, had two brothers who were living and well. There was no familial history of congenital abnormalities. A uterus didelphys with septate vagina was disclosed at necropsy. Other abnormalities included separation of the pubic bones, absence of the twelfth ribs, and an accessory muscle band in the right ventricle.

External Junction With Persistence of Septum (Group I B 1).—CASE 4.—A white woman, aged thirty-nine years, first came to the clinic for resection of a vaginal septum and dilatation and curettage for incomplete abortion. The pregnancy had occurred in the right side of a double uterus. She returned later and died of chronic ulcerative colitis, bronchopneumonia with abscesses and gangrene.

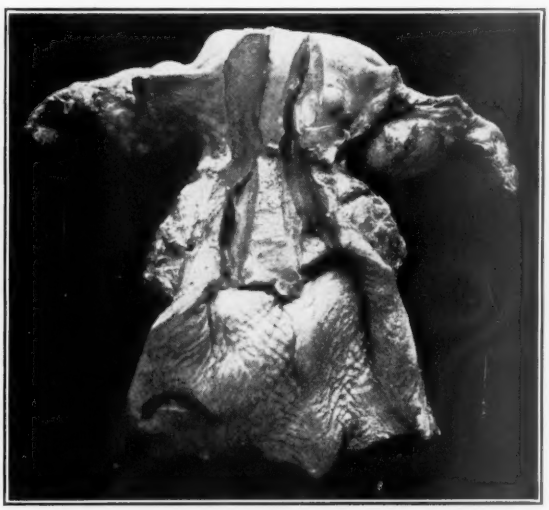

Fig. 4.—Uterus duplex with septate vagina in Case 4; vaginal remnant is represented by the elevation on the posterior vaginal wall.

She had been married thirteen years and had had one pregnancy, the one noted previously. She had one brother and one sister who were living and well. There was no history of familial abnormalities. Her menses had started at the age of thirteen years; had occurred every three or four weeks and had lasted two or three days. Necropsy disclosed a uterus duplex with septate vagina (Fig. 4). A small subserous fibroid also was noted. No other abnormality of a congenital nature was found.

CASE 5.—A white female infant was stillborn. The mother had a uterus bicornis duplex with a vaginal septum. Necropsy revealed that the infant had a uterus duplex with septate vagina. There was no other abnormality of a congenital nature.

CASE 6.—The patient in this case was a white female infant, aged fifteen days. The familial history was not noted. Necropsy revealed an imperforate anus (cloaca) and uterus duplex with septate vagina. In addition, there were hydroureters and hydronephrosis Grade 3 (Fig. 5), spina bifida occulta of the first sacral segment, and a patent ductus arteriosus.

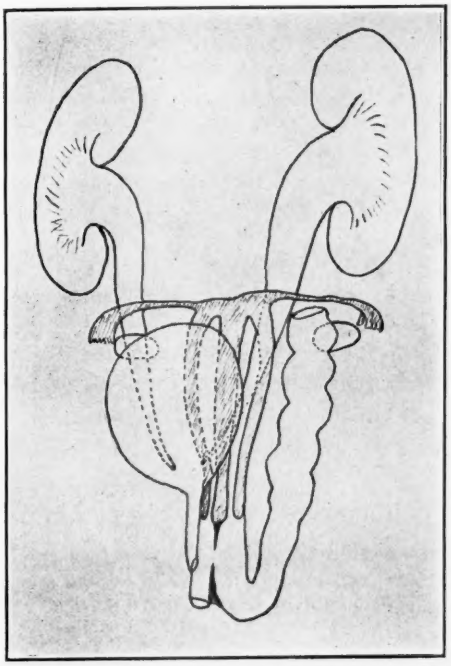

Fig. 5.—Anomalies noted in Case 6.

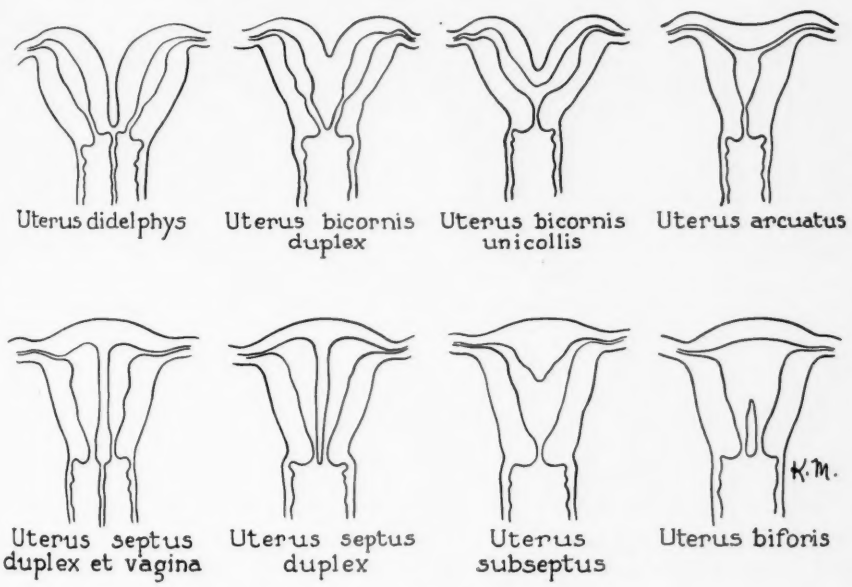

Fig. 6.—Uterus subseptus in Case 7.

CASE 7.—A white woman, aged forty-three years, had been married eighteen years but had not become pregnant. Her menses had been normal. Necropsy revealed a uterus subseptus and multiple leiomyomas (Fig. 6). The left fallopian tube and ovary had been removed at a previous operation and the right pelvis was the seat of a tuboovarian abscess. No other congenital abnormality was noted.

Rudimentary Uterus With Absence of Vagina (Group II A 1).—CASE 8.—The patient in this case was a single white woman, aged twenty-eight years. She had one sister who was living and well, but who had one child with spina bifida. The patient's grandmother had had one child who was deformed. The patient had never menstruated. Her breasts and vulva were developed about normally. Necropsy revealed a uterus rudimentaris solidus duplex with artificial vagina. There was also a unilateral ectopic single kidney with fusion at the upper pole; this kidney was situated to the right of the mesospinal line, just above the pelvic brim. There was only one renal pelvis and one ureter; the latter opened into the renal pelvis at the usual site of the left ureteral orifice. No ureteral orifice was noted on the right side.

CASE 9.—A white married woman, aged twenty-two years, had four brothers and two sisters who were living and well. She never had menstruated, but each month she had noted backache, cramps, and weakness. She had been married five years and had carried on intercourse through the urethra. Recently, she had noted nocturia, urinary frequency and burning, and occasional hematuria. Necropsy revealed a uterus rudimentaris solidus duplex. There was a polyp of the bladder at the urachal opening and a diverticulosis of the colon.

CASE 10.—A white woman, aged twenty-four years, had one brother and one sister, who were living and well. She had never menstruated, but monthly had noted some cramps in the lower part of the abdomen. The vagina was about 1 inch (2.5 cm.) in length and the urethra was dilated and ragged. There was some urinary incontinence. The patient had been married three years. Necropsy revealed a uterus rudimentaris solidus duplex with an artificial vagina (Baldwin type).

Rudimentary Uterus With Incomplete Development of One Side (Group II A 2).—CASE 11.—A white woman, aged thirty-three years, had two brothers and three sisters who were living and well. She had been married twice; with her first husband she had had four children, all living and well, and one stillbirth. She had noted some menorrhagia for eight days before she came to the clinic, but for two years prior to her death the menses had lasted four to five days. Necropsy revealed that the fallopian tube, ovary, kidney, ureter, suprarenal glands, and renal artery were absent on the right side. There was a dimple in the bladder at the site of the right ureteral orifice, and there also was a dimple in the aorta at the site of the right renal artery. The left kidney showed a compensatory hypertrophy and weighed 310 gm.

CASE 12.—A single white girl, aged sixteen years, had one brother and one sister who were living and well. Her menses had started at the age of thirteen years, had recurred every three weeks, and had lasted seven days each time. She had not experienced any difficulty during menstruation. Necropsy revealed an absence of the tube and ovary on the left side and a hematoma of the right ovary.

CASE 13.—The parents of a stillborn female infant did not give any familial history of congenital abnormalities. Necropsy on the infant disclosed a single uterus on the left side; the left tube was situated in the normal position and the left ovary was situated near the horn of the uterus. The left tube ended blindly at a point near the lower part of the uterus. The left ovary consisted of an elongated, thin structure which was situated close to the tube throughout its length. Other abnormalities noted included a meningomyelocele with internal hydrocephalus (Grade 2

on a basis of 4), bilateral talipes equinovarus, an absence of the left kidney (the right was U-shaped) and an absence of the right patella.

CASE 14.—A married woman, aged thirty-three years, had had six children, three of whom were living and well. There were three siblings who were living and well. Her menses, which had started at the age of thirteen years, had been regular and accompanied by a slight dysmenorrhea. Necropsy revealed that the right tube was inserted slightly to the right of the uterine fundus and that the left tube was inserted low on the left side of the uterus near the junction of the cervix and fundus. There also was a congenital absence of the left kidney and ureter.

Rudimentary Development With Hypoplasia of One or More Parts (Group II B 1).—CASE 15.—A white woman, aged fifty-six years, had been married twenty-five years but never had been pregnant. Her menses, which had started at the age of fourteen years, had been regular and apparently had been without symptoms.

Fig. 7.—Specimen obtained in Case 16; *a*, atresia of vagina (probe indicates vaginal orifice); *b*, rudimentary uterus.

Necropsy revealed a definite hypoplasia of the right half of the uterus and almost complete obliteration of the uterine canal. There was no other congenital abnormality.

Atresia (Group III).—CASE 16.—A girl, aged four years, had three siblings, who were living and well. The patient had been born with a mass on the lower part of the abdominal wall; urine had dribbled from this mass. Necropsy revealed a rudimentary uterus with marked atresia of the vaginal orifice (Fig. 7). Exstrophy of the bladder and separation of the symphysis pubis were also noted.

CASE 17.—A woman, aged thirty-eight years, had two siblings, who were living and well. The patient had had three pregnancies: one child was living and well and the other two pregnancies had terminated as miscarriages. Her menses had started at the age of seventeen years, had recurred every four weeks, and had lasted three days. There was no history of dysmenorrhea. Necropsy revealed an atresia of the left fallopian tube near its junction with the uterine fundus. There was no other congenital abnormality.

COMMENT

The frequency of uterine abnormalities has been variously estimated. Smith,[22] in a résumé of the cases reported from the New York Lying-In Hospital, said that the incidence of uterine abnormalities among pregnant women was 1 in 1,458. The most frequently encountered abnormality in his series of 35 cases was uterus duplex with septate vagina. There were 12 such cases in his series. Findley,[6] in his paper on uterus didelphys, said that Stolper[24] noted 10 instances of uterus didelphys among 7,400 married women and that Neugebauer[17] noted 3 instances in 19,000 examinations. Haynes[7] found 6 instances of bicornate uterus, 1 instance of uterus septus, and 4 instances of uterus didelphys in the 11 cases he reviewed.

In the 17 cases which form the basis of this report, the incidence of congenital anomalies of the female genital tract was as follows: uterus didelphys, 3 cases; uterus duplex and septate vagina, 4 cases; uterus rudimentaris solidus duplex with absence of vagina, 3 cases; absence of fallopian tube and ovary, 2 cases, and uterus unicornis, abnormal insertion of fallopian tubes, hemihypoplasia of uterus, rudimentary uterus with atresia of the vagina, and atresia of a fallopian tube, 1 case each.

Failure of fusion of the müllerian ducts probably represents the most primitive form of anomaly of the female genital tract. The anomaly may be of two types: in one type there is a symmetrical reduplication as represented by uterus didelphys, and in the second type there is an external fusion with incomplete disappearance of the septum, as represented by uterus duplex and septate vagina.

In 3 of the 7 cases in which the genital anomalies were the result of failure of fusion of the müllerian ducts, the patients were married women. Only 1 of these 3 women had ever been pregnant, and in this case the pregnancy had terminated in an abortion. It is interesting to note that these 3 patients did not have any other congenital anomaly or any evidence of dysmenorrhea; however, 1 of these patients had multiple leiomyomas.

A review of the literature indicates that most patients who have uterine abnormalities lead a perfectly normal existence. The abnormality usually is noted by the physician at the time of pregnancy or at pelvic examination in the course of disease of the genital organs or in the presence of entirely irrelevant symptoms which necessitate a complete physical examination. Occasionally one horn of an abnormal uterus may become filled with retained menstrual products and give rise to a unilateral dysmenorrhea. This symptom was first noted by M. H. Phillips.[19] Masson and Mueller[14] as well as D. A. MacDonald[13] have reported cases of this type.

In considering the means of diagnosis, if the history is unavailing, palpation may often give a clue. Roentgenographic examination following the injection of iodized oil into the uterine horns has been utilized by

Steinharter and Brown.[23] These authors, however, specify that the injection of iodized oil for diagnosis during pregnancy should be reserved for those patients in whom continuation of pregnancy is contraindicated.

In the other 4 cases in which congenital anomalies were the result of failure of fusion of Müller's ducts, the patients were infants. Three of these infants also had other congenital anomalies. The mother of the fourth infant had a uterus bicornis duplex with septate vagina.

All types of pathologic lesions may be associated with congenital abnormalities of the uterus. Abramson[1] noted pregnancy in one uterus and fibroids in the other uterus in a case of uterus didelphys. Epstein and Goldberg[4] reported a case in which a pregnancy in a uterus didelphys resulted in streptococcic peritonitis.

In 8 cases the genital anomaly was the result of rudimentary development. In 7 of these cases the patients were adults and in the other case the individual was a stillborn infant. Five of the women were married and 2 were single. Two of the married women could not have become pregnant because of absence of the vagina. Two of the 3 remaining married women had become pregnant; 1 of these women had had 6 children while the other woman had had 4 children and 1 stillbirth.

The question of fertility in cases of genital abnormalities has been raised many times in the literature. Many authors appear to believe that a patient who has a uterine abnormality is almost certain to be sterile, yet a brief review of the literature reveals that most abnormalities of the female genitalia have been first noted during pregnancy and that many of these patients had had previous pregnancies which apparently had been normal.

Findley reviewed a series of 135 cases of uterus didelphys in which pregnancy had occurred. In these cases, there were 217 full-term babies, 13 twin pregnancies, 15 premature deliveries, and 86 abortions. Malformation of the baby occurred in 2 cases. Dannreuther[3] reported 13 cases of congenital anomalies of the female pelvic organs. Eleven of the patients in these cases were married, but 5 of the 11 never had become pregnant. The other 6 women collectively had had 16 children and 11 miscarriages; 5 of the miscarriages admittedly were induced abortions. Smith said that patients who have double uteri show less tendency to become pregnant than do normal women, but that after women who have double uteri once become pregnant, they have the same tendency to become pregnant as do normal women. Smith also noted an increased tendency to abortion and premature labor, and he and Findley both stressed the frequency of abnormal position of the fetus in cases of uterus didelphys. Findley noted 13 breech presentations, while Smith concluded that there was an increase in the incidence of breech and transverse positions in such cases.

In a case of uterus duplex bicollis, Moench found a seven months' fetus in one horn and a three months' fetus in the other horn. This

finding seems to indicate that there is a distinct possibility of superfetation in cases of double uteri. In the 3 cases of uterus rudimentaris solidus duplex, 2 of the patients had symptoms which were suggestive of menstruation. One of the 2 married women who had this type of genital anomaly gave a definite history of intercourse through the urethra, while the urethra of the other woman was dilated and had a ragged border. In 1 of these cases there was a history of other abnormalities in the family. Of the 4 adult patients who had vaginae and uteri, 1 had menorrhagia, 1 had slight dysmenorrhea, and the other 2 had normal menses. In 5 of the entire group who had genital anomalies which were the result of rudimentary development, other congenital anomalies were present.

The genital abnormality was the result of atresia in 2 cases. There was no family history of congenital abnormalities in either case. In 1 case the patient was a girl, in the other case the patient was a woman who had been pregnant three times. One of these pregnancies had produced a living child but the other 2 had terminated as miscarriages.

SUMMARY

This report consists in a review of the embryology of the female genital system, a brief review of the various theories concerning the etiology of uterine abnormalities, and the pertinent findings in 17 cases of uterine abnormalities. This group represents 11 adults and 6 children. In 2 cases there was a familial history of congenital abnormalities and in 9 cases there were abnormalities other than those of the genital system. Four of the patients had menstrual symptoms and 9 of the patients were married. Five of the married patients never had been pregnant. Four of the patients collectively had been pregnant 15 times. These pregnancies had resulted in 11 children, 1 stillbirth, and 3 miscarriages.

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A STATISTICAL STUDY OF THE TREATMENT OF PLACENTA PREVIA*

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OF RECENT years there has been a sharp controversy as to the proper treatment of placenta previa. In general there are three points of view: the radical, so called, favoring cesarean section; the conservative, favoring delivery from below; and what one might call the individualistic, favoring whatever method of delivery seems best in each case. As a consequence there is no established treatment for placenta previa either in this country or abroad.

There are many reasons for this difference of opinion. There are innumerable factors to be considered. It is not necessary to mention all of these, but a few of the more important refer to the type of placenta previa, the parity of the patient, the presentation, the general physical condition, the amount of hemorrhage, the period of gestation, and the equipment available. There are many others. Again the operation of cesarean section was not formerly as safe for the mother as it is today. With the new type of operation women may be cesareanized after they are potentially infected; this was not deemed advisable in former years. Still another reason is the influence of obstetric leaders and teachers and a more surgically minded point of view, at least in this country.

If placenta previa were a frequent complication of pregnancy, obstetric opinion as to its treatment would undoubtedly be more united. The incidence is variously stated, but probably approaches one case in each thousand deliveries. It is more common in hospital statistics for obvious reasons. Therefore any one operator is not likely to see a very large series in a lifetime.

At present most obstetricians seem to be in accord that primiparas with central placenta previa should be delivered abdominally. Conversely, it would appear that the multiparous woman with a marginal previa, well advanced in labor, should be delivered vaginally. Between these two extremes lies the majority of cases, and the question of proper procedure in such instances has created a complex situation.

It was felt that a large series collected from the world literature might be of interest. There is little or no use in attempting to draw conclusions from a few thousand cases, as the individual equation of the writer must introduce a factor of error. However, if the series is large enough, the personal point of view tends to be minimized and one should approxi-

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mate truly representative results. For this reason the literature of the world for the years of 1924 to 1933 inclusive was completely reviewed, and this ten-year period used as a basis. Further than this a second series of unreported cases embracing the same time period was collected. In the actual assembling of the statistics from the literature, papers were studied which were included in the indices under the general heading of placenta previa; probably a number of other cases reported under the headings of cesarean section, version, etc., were overlooked. As will be seen figures presented are from most of the principal countries of the world.

It is no part of the scope of this paper to present a monograph on placenta previa. Such questions as the etiology, the symptomatology, and the diagnosis are left untouched. The object is rather to present the results, in terms of maternal and fetal mortality, of various forms of treatment. Moreover, in this paper, all vaginal forms of delivery are grouped together whether they be spontaneous or by any means whatsoever as "delivery from below," the only stipulation being that the delivery be a vaginal one. This method of delivery is then contrasted with abdominal delivery and the results expressed in various charts and tables.

It should be understood that this study does not necessarily represent a personal view. The method of preparing the data was to collect all cases of placenta previa, noting how they were delivered, and then ascertaining how many women lived and how many died. These, with similar notations as to the infant, were the only criteria employed.

Twenty-two thousand one hundred and fifteen comprise the total number of cases upon which this study is based. Five hundred and ninety-one of these are heretofore unpublished, but were included in the paper through the courtesy of the heads of various clinics in this country and abroad. Unfortunately not all of the published reports contain full information about each and every factor with which the study is concerned; thus, in some parity is not given, in others the degree of placenta previa is not stated. As a consequence some of the charts which follow employ percentage basis thus utilizing all cases in which full data are available.

Chart 1 illustrates the distribution of cases as regards the degree of placenta previa and the parity of the patient. Here a word as to definition is required. The classification used in this study is as follows: if the placenta practically covers the internal os, it is called central; if the os is but partially covered, it is called lateral; if only a margin of placenta is felt, then it is classified as marginal placenta previa. Using these criteria 29.3 per cent were central, 23.6 per cent were lateral, and 47.3 per cent were marginal. In approximately 75 per cent of the series the patient was a multipara, while in 25 per cent she was primiparous. This ratio is higher as regards the primiparas than is usually encountered, but it is thought that authors have tended to report their primiparous cases more readily, as they are frequently more serious and more difficult to handle.

The incidence of cesarean section is demonstrated in Chart 2. One-fifth (19.7 per cent) of the total series was delivered by abdominal section, leaving about four-fifths to be delivered from below. This incidence is divided into years and expressed graphically. Here it is seen that if the high peak of 1927 be disregarded as an artifact there is a more or less regular curve which reaches its peak in 1932. The drop in 1933 is due to the fact that the series for this year is small, as many reports would tend to appear during the year 1934, covering the preceding year's work, and reports appearing in 1934 were not included in the study. If now two five-year

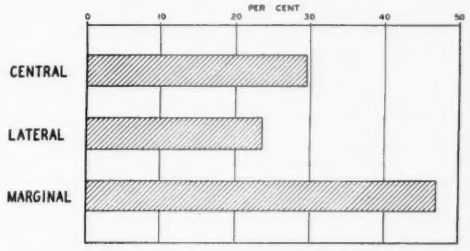

Chart 1-*A*.—Distribution of degrees of placenta previa.

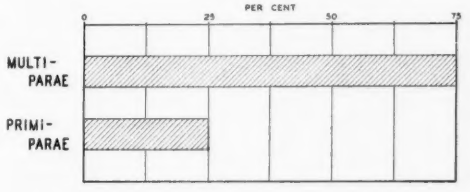

Chart 1-*B*.—Distribution of primiparas and multiparas.

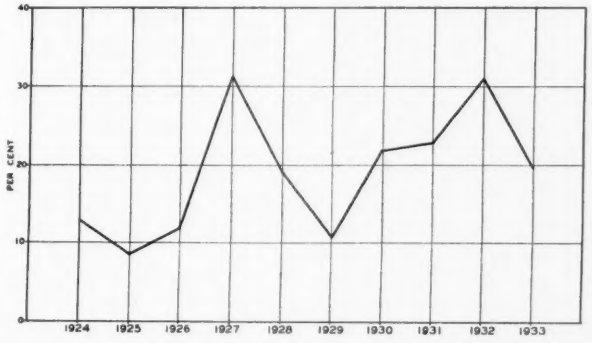

Chart 2.—Percentage of placenta previa delivered by cesarean section (1924-1933).

periods are considered, the incidence of cesarean section from 1924 through 1928 is 16 per cent, while from 1929 through 1933 it is 21 per cent, an increase of 5 per cent. Among other reasons it is believed that this increase may be partly explained by the more frequent and universal use of blood transfusion as well as by the growing tendency frequently to consider placenta previa an indication for surgery.

In the total series the maternal mortality after cesarean section is 6.6 per cent, while after delivery from below it is 8 per cent. In themselves these figures approximate one another, but when it is realized that their numerical expression represents a difference of over three hundred fatal outcomes, their significance is more

truly appreciated. Chart 3 illustrates the maternal mortality by years. Here it is seen that there has been a gradual reduction in mortality regardless of the method of delivery. The chart shows that the mortality from delivery through the vagina was higher in most years than after cesarean section. In only one year, 1932, when there was an unusually high percentage of cesarean sections done, was the mortality rate from this operation relatively high as compared with vaginal delivery.

Chart 4 presents a graph which shows the fetal mortality after various methods of delivery. This is definitely lower, as might be expected, each year with abdominal delivery. Fetal mortality is understood to be a total figure representing stillbirths,

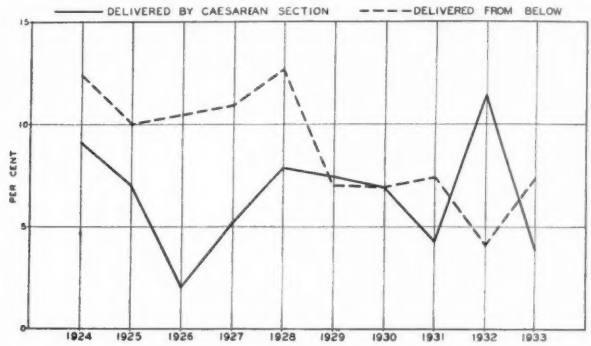

Chart 3.—Maternal mortality in cases of placenta previa delivered by cesarean section and from below (1924-1933).

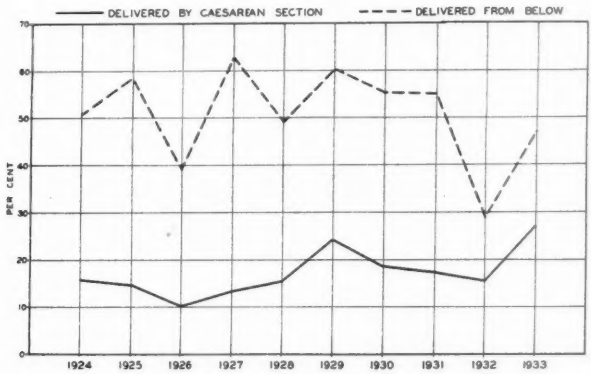

Chart 4.—Fetal mortality in cases of placenta previa delivered by cesarean section and from below (1924-1933).

neonatal deaths, monsters, and immature, nonviable fetuses. Prematurity and immaturity contribute to cause a high mortality rate in any study of placenta previa. In a series as large as this it was felt that any correction which might be made on total fetal mortality would be useless as the various factors would tend to equalize themselves in the contrast between methods of delivery. Total figures show that 17 per cent of the babies born after cesarean section were lost, while 53.7 per cent died following delivery from below.

The treatment and the results of treatment based on the degree of placenta previa existing are presented in Chart 5. As has been stated above, not all the reports provide information as to this factor so this is prepared on a percentage basis, em-

ploying only those cases in which this information is available. Chart 5 shows that cesarean section was performed in 48.3 per cent when the placenta was centrally inserted, in 15.7 per cent when it was lateral, and in 7.5 per cent when it was marginal. The incidence of delivery from below is the reciprocal of these figures.

Chart 6 presents a composite table which shows both maternal and fetal mortality after delivery by cesarean section and from below based on the degree of placenta

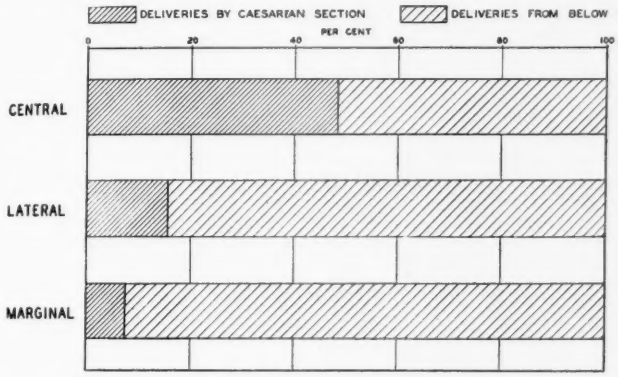

Chart 5.—Percentage of deliveries by cesarean section and from below based on the degree of placenta previa.

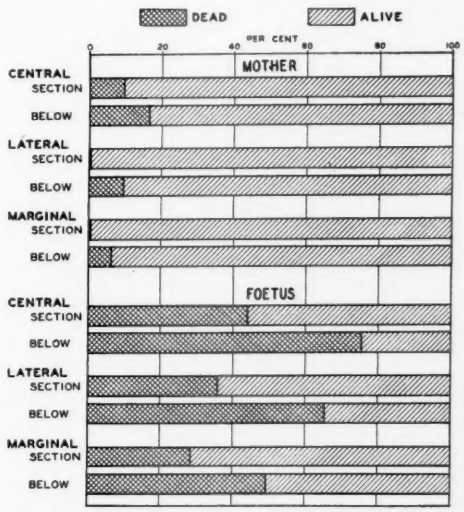

Chart 6.—Percentage of maternal and fetal mortality after delivery by cesarean section and from below based on the degree of placenta previa.

previa. Here again figures are expressed on a percentage basis, and they comprise all the cases in which sufficient data are given. In central degrees of previa when delivery is by abdominal section the maternal mortality is 9.4 per cent and the fetal mortality is 43.7 per cent. After delivery from below these figures rise to 16.5 per cent and 75.0 per cent, respectively. When the placenta is laterally inserted cesarean section provided a death rate to the mother of less than 1 per cent, and a fetal mortality of 15.8 per cent, while other methods of delivery gave figures of 9.7

per cent for the mother and 65.1 per cent for the baby. In the marginal type of previa less than 1 per cent of the mothers and 28.6 per cent of the infants failed to survive after abdominal delivery, but 6.4 per cent of the mothers and 49.1 per cent of the babies died after delivery through the vagina.

A few rather interesting facts are here brought out. There was almost no maternal mortality in the partial or marginal varieties of placenta previa when patients were cesareanized. The maternal mortality from lateral placenta previa delivered from below is higher than that of central placenta previa delivered by abdominal section. The fetal mortality in partial placenta previa is much higher than that of the marginal type, both types being treated by cesarean section. In each degree of placenta previa, cesarean section gives a lower mortality than does delivery from below.

It should be most clearly understood that these last two charts representing results based on the degree of placenta previa do not include the entire series of 22,000, but only those cases in which full information is specified. However, it would seem to show that the risk of this operation in such cases is not unduly great, although many authorities have held that the opposite is true. It is common practice to consider a placenta previa centralis a more suitable case for section than a previa of one of the other varieties. These studies tend to show that there is a very definite maternal mortality to delivery from below, even in the marginal type. To put it in a more graphic fashion, the mortality in delivery of partial placenta previa from below is more than 3.0 per cent higher than the average mortality of the more than 4,300 cesarean sections performed for all types of placenta previa.

It is of interest to examine the statistics from a geographic point of view. Some countries have been grouped together for this purpose: thus, Central Europe includes Germany, Austria, and Hungary; Great Britain includes England, Scotland, Ireland, Australia, and South Africa; Scandinavia embraces Sweden, Denmark, and Norway; while all of South America is grouped together. The incidence of cesarean section in various countries from which data are available is shown in Table I.

TABLE I

Italy	66.2 per cent
France, Belgium, Netherlands	30.2 per cent
Central Europe	21.4 per cent
Spain and Portugal	20.5 per cent
United States	17.3 per cent
Scandinavia	11.8 per cent
Philippines	8.2 per cent
Russia, Finland, Poland	8.2 per cent
Great Britain	6.8 per cent

This table demonstrates the care which must be exercised in interpreting such statistics as are available. Thus, it is not conceivable that of all cases of placenta previa in Italy, two-thirds of the patients were delivered by cesarean section. However, of the published papers and reports which have been studied, this is a fact. Probably it would be no more than fair to say that there is a distinct tendency toward the so-called radical treatment of placenta previa in Italy. This is reflected in the reports from the Italian provinces in Africa where it may be assumed that the teachings of the Italian schools prevail.

The incidence of cesarean section has been worked out to determine if there has been a trend toward or away from this operation during the past ten years in the various countries. Not all of these nations have reported cases enough each year to make it either accurate or profitable to attempt this study in every instance, so

the four principal countries reporting the largest number of cases have been employed to determine this trend. Moreover five-year averages have been given, thus summarizing the incidence from 1924 through 1928, and then from 1929 through 1933. Table II expresses these averages.

TABLE II

	1924-1928	1929-1933
United States	13%	45%
Central Europe	38%	37%
Great Britain	51%	5%
France	92%	23%

It is thus seen that the United States is the only one of these countries in which the trend has been more toward so-called radicalism in the treatment of placenta previa, although the trend in the Central European countries has remained approximately the same. However, when one compares the maternal mortality in the United States during the two five-year periods, it is seen that an increase of 32 per cent in the incidence of abdominal delivery is accompanied by a decrease of about 5.5 per cent in maternal mortality.

The results of treatment of placenta previa in the various countries have been expressed in terms of maternal mortality after delivery by cesarean section and after delivery from below in Table III. The two columns have been arranged to show the countries with the highest mortalities at the top of the list—on the left in terms of patients delivered abdominally, on the right in terms of patients delivered vaginally.

TABLE III

Philippines	21.6%	Russia, Finland, Poland	17.9%
Russia, Finland, Poland	11.1%	Philippines	17.4%
Central Europe	10.2%	United States	10.8%
France, Belgium, Netherlands	7.9%	Great Britain	9.6%
United States	5.9%	France, Belgium, Netherlands	8.6%
Great Britain	5.5%	Central Europe	7.1%
Spain and Portugal	4.7%	Scandinavia	5.8%
Scandinavia	4.6%	Spain, Portugal	4.9%
Italy	0.7%	Italy	4.0%

Or, arranged in a different way (Table IV) with the percentage of maternal mortality after cesarean section and after delivery from below placed after each country.

TABLE IV

Philippines	21.6%	17.4%
Russia, Finland, Poland	11.1%	17.9%
Central Europe	10.2%	7.1%
France, Belgium, Netherlands	7.9%	8.6%
United States	5.9%	10.8%
Great Britain	5.5%	9.6%
Spain, Portugal	4.7%	4.9%
Scandinavia	4.6%	5.8%
Italy	0.7%	4.0%

It is thus seen that some countries, among which are the United States, Great Britain, France, Spain, Italy, and the Scandinavian countries, have obtained better results so far as maternal mortality is concerned by the use of cesarean section. In the other countries, notably in Central Europe, the reverse is true.

SUMMARY

A series of 22,115 cases of placenta previa has been studied. This series, the largest noted in the literature, has been taken both from the published reports of the world and from a smaller number of hitherto unreported cases.

The two phases, treatment and the result of treatment, in terms of maternal and fetal mortality, have been considered. Delivery has been divided into two groups: one comprising those women delivered by cesarean section, the other those delivered by any other means. Various other factors such as the parity, and the degree of placenta previa have been studied. Maternal and fetal mortality has also been classified, based according to the degree of previa of the placenta and upon the method of delivery.

In discussing mortality it has been emphasized that total, global mortality is meant. No corrections have been applied in this regard, either in the case of the mother, to those women dying of causes not purely obstetric or, in the case of the baby, to immature, nonviable fetuses, or to monsters.

A study of the trends during the past ten years of the two methods of delivery of this complication of pregnancy has been appended. Further than this, mortality curves for mother and baby have been prepared showing the incidence during the years covered in the review.

Statistics are presented covering the facts reported from the principal countries of the world. Thus the incidence of method of delivery and the results of treatment, again in terms of maternal mortality, are shown, and various contrasts between these factors are drawn.

CONCLUSION

In general, the risk for mother and baby in cases of placenta previa is less when delivery is terminated by cesarean section than it is following delivery from below.

I should like to express my sincere appreciation to Dr. Walter McMann, late of this city, for his very great help in compiling certain of the statistical data which have been used in this study.

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Solomons, Edward, and Dockeray, Gerald C.: Vaginal Discharges, Irish J. M. Sc., page 548, 1936.

Fifty-three women who complained of vaginal discharge and ten normal pregnant women without discharge were examined for *Trichomonas vaginalis.* In a total of 78 cases, 9 had trichomonas present and 8 had *Trichomonas vaginalis* vaginitis. None of the patients without discharge had trichomonas.

The parasite is more frequent in pregnancy and addition of female sex hormone to culture media stimulates its growth (Donne). Unexplained virginal leucorrhea is often due to this parasite.

At the present time the methods of treatment are numerous and the results vary. The authors employed ichthyol-glycerin tampons with poor results. Devegan gave a better response. The finding of 15 per cent of patients with vaginal discharge containing *Trichomonas vaginalis* warrants the routine examination of all discharges of unknown etiology for the presence of the parasite. In the authors' hands Devegan proved valuable in patients suffering from vaginal discharges due to trichomonas or of obscure origin.

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CLINICAL CLASSIFICATION OF CASES OF CARCINOMA OF CORPUS UTERI*

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THE pathologic grading of carcinomas of the corpus, according to cell type and arrangement, is now on a firm foundation and proving very useful. It helps not only in pathologic study but also in the selection of treatment, especially in the handicapped patient who is near the borderline of operability. This grading by cell type has proved more useful in corpus carcinoma than in carcinoma of the cervix. On the other hand, the attempt at a useful clinical classification of corpus cancer cases has not succeeded as it did with cancer of the cervix, where the clinical classification into stages according to extent of tumor growth is now well established and in general use.

A dependable clinical classification of cases of carcinoma of the corpus is a complicated matter, much more complicated than appears on the surface. It has been delayed by difficulties not found in carcinoma of the cervix. In cervix cancer the location and extent of the infiltration can be determined by direct palpation, and the depth of the vaginal and cervical ulcerations are open to easy and accurate inspection. Not so in corpus cancer, where the various stages of extension into the thick uterine wall defy palpation and inspection, and can be outlined only after the uterus is removed.

However, despite the difficulties, the attempt to work out a satisfactory clinical classification of these cases should be persisted in and vigorously pushed. The reliable and uniform grouping of these cases into clinical stages representing extent of growth is absolutely necessary for the evaluation of treatment results. In comparing the results of different methods of treatment, the comparison must be made between cases of the same approximate extent of involvement, i.e., early cases to early cases, medium advanced to medium advanced, and late cases to late cases. Otherwise there may be erroneous conclusions as to the efficacy of the different treatment methods. This point is illustrated by our Barnes Hospital series of five-year results in corpus carcinoma (*Am. J. Obst. & Gynec.* 29: 326, 1935). In the fifty-six patients treated before 1929, death resulted in nearly all patients receiving only radiation treatment. Thus the general results would indicate

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that radiation has very little effect toward cure. But when the extent of the disease is looked into, we find that practically all patients presenting reasonable hope of cure were subjected to operation, radiation alone being limited to the hopeless cases. Hence, the general results do not show the relative efficacy of radiation even of those days, and much less of the improved radiation of the present.

A uniform method of clinical classification according to extent of involvement is imperative, not only for evaluation of treatment results in reported cases, but also as a guide to the selection of the best treatment for patients as they come day by day. Such classification requires careful examination and accurate recording of findings before operation and then of gross findings at operation and then of gross findings in the laboratory. This division into stages representing extent of growth must of course be founded on a solid pathologic basis. That is, the clinical stages cannot be defined by symptoms but must represent definite extent of growth as determined by examination at operation and in the laboratory. Hence, the stages of the classification to be made before operation as a guide to treatment must be defined in terms of pathologic extent which can be accurately determined only after operation. This paradox shows very well the vicious circle of difficulties encountered, and the reason why the solution of this important problem has been so long delayed.

Having identified the difficulties, we are in a better position to attack the problem successfully. In the first place, it is clear that the stage-classification made before operation cannot be accurate, only approximate. But by utilization of all the factors which help toward accuracy, the preoperative classification may be made to approximate so closely the actual extent as to be of material assistance in the selection of treatment for that patient. The first task is to define the stages in terms of pathologic extent, and the second and more difficult task is to devise a plan of recognizing the stages approximately before operation.

Classification into Stages.—The division of a continuous process into stages necessitates dealing with borderline areas about which there may be differences of opinion as to preferable assignment. However the important thing is not exactly where the lines of division are placed but that they should be placed definitely somewhere, and then that this definite classification be used in all clinical work and in all reports of cases. The following classification into stages is definite and practical, and stands the test of application in the examining room and at the operating table and in the laboratory. Each of these stages was selected with two points in view: first, to have its limits correspond with anatomic lines as far as practicable so as to be well defined and easily described, and, second, to have it recognizable clinically

before operation as far as possible with the various helps available. The six stages, each representing a definite extent of involvement, are as follows:

Stage I: Endometrium alone involved.

Stage II: Definite involvement of the muscular wall, but not beyond its middle.

Stage III: Extension to the outer half of the uterine wall, but not beyond the borders of the uterus. This includes extension to the peritoneal coat with possible areas of adhesive peritonitis, but without carcinomatous involvement of the adhesions.

Stage IV: Extension to surrounding structures but not beyond removable ones, such as adnexa and adjacent portions of the broad ligaments. There may or may not be extensive intestinal or other peritoneal adhesions, but no extension of carcinoma cells into such adhesions.

Stage V: Extension into structures not advisable to remove, but removal of the original tumor is still practicable. The carcinomatous extension may be into an adherent coil of intestine or an adherent area of bladder wall, or it may be along the broad ligament lymphatics into the deep structures of the pelvic wall.

Stage VI: There is such extensive involvement of surrounding structures that not even the main tumor mass can be safely removed.

Clinical Recognition of Stages.—Clinical recognition or identification of the stage in a particular case is useful in two ways, namely, in accurate reporting of the case and in selection of treatment for the patient. Identification of the stage of involvement for case reporting is a comparatively simple matter, because the report is made after treatment, and hence, in most cases the uterus is out and available for sectioning. Identification of the stage of involvement for the selection of treatment is a much more difficult matter, for it must be made before the uterus is removed. It is this last and difficult identification which I wish to discuss in particular.

There are a number of factors concerned in the early identification of the stage of involvement, early enough to be of assistance in deciding what treatment to give the patient. These factors are as follows: History of the case, pelvic examination, curettage-exploration of cavity and deep pelvic palpation under anesthesia, microscopic examination of curettings, and special examination methods, including gastrointestinal x-ray, cystoscopic examination, x-ray visualization of uterine cavity, and finally uteroscopy.

History.—This gives the time of onset of the symptoms, and the severity and progress of the same. This information indicates in a general way the age of the growth and the amount of tissue disturbance. However, possible errors of interpretation must be kept in mind. The first symptoms may have been due to some other condition, the endometrial carcinoma coming later. Likewise the severity of the symptoms may be due to some complication. Even though the bleed-

ing be due entirely to the carcinoma, its severity is only a very general indication of the extent of tissue involvement, for severe hemorrhage may sometimes come from a small area.

Inquiry is to be made as to previous examinations and treatments. An examination years before may have revealed a fibroid, which fact would account for the enlarged uterus instead of assuming it all to be due to the carcinoma. The patient may have been curetted several months or a year or two previously, and the microscopic report on the curettings may help in closer determination of the beginning of the malignant change.

Pelvic Examination.—Careful bimanual palpation of the pelvic structures is the most useful examination measure in determining the extent of involvement in Stages III to VI inclusive. In Stages I and II hardly any enlargement would be found, except from some complication, and the absence of definite enlargement or induration would narrow the diagnosis to Stages I and II. In a patient with no complicating pelvic inflammation, superficial tenderness of the corpus uteri would indicate peritoneal involvement (Stage III), while deep tenderness only would indicate that the infiltration was still confined to the muscular wall (earlier Stage III or Stage II).

Superficial tenderness about the upper part of the uterus, associated with considerable enlargement and irregularity, should arouse suspicion of involvement of an adherent intestinal coil or area of bladder wall (Stage IV) but does not establish it, for such enlargement and tenderness may be due simply to a projecting mass in the uterine wall with some irritative peritonitis. The question of intestinal wall or bladder wall involvement (by plastic adhesion or cancerous penetration) may be elucidated by gastrointestinal x-ray or cystoscopic examination as mentioned later. The distinction between Stage V (removable mass) and Stage VI (irremovable mass) can be definitely made only during operation. Though the preoperative findings of a large mass with extensive fixation may give the impression of irremovability, the point can be decided with certainty only after the abdomen is open.

Curettage.—The laboratory examination of the curettings establishes the diagnosis of corpus carcinoma, and the deeper pelvic palpation under the analgesia gives additionally accurate palpation findings to assist in determining the stage of development of the growth. The curettage furnishes information also as to the size and shape of the uterine cavity, and may give clear indications of a projecting large or small mass. The approximate location of a limited growth may sometimes be ascertained by noting at which part of the wall the thick curettings are obtained. An idea of the surface width and length of the growth may be revealed in the same way. A hint of the depth of the growth may be given by the thickness of the curettings and

by an appreciable cavity being felt with the curette after the curettage, keeping in mind, of course, that firm infiltration extends some distance beneath the soft tissue removed. Considerable information as to the contour of the uterine cavity, before and after the curettage, may be secured by careful manipulation of the end of the curette.

Microscopic Examination.—The microscopic examination of the curettings, besides establishing the diagnosis of carcinoma, assists toward identification of the stage of involvement in two ways. In the first place, muscular tissue may be found in the sections, and thick pieces give an indication of the depth of penetration, remembering that beyond the soft tissue removed in the curettage there is an area of firm infiltration.

In the second place, the pathologic diagnosis shows the cell type and arrangement (pathologic Grades 1, 2, 3, or 4), and this may furnish some indication of the age of the growth and hence of its extent. There is a tendency to think of the cell type of growth as a fixed and continuing type in each case. But it may represent only a certain age in the development of the carcinoma, and if we knew the age-significance of the microscopic type encountered in the diagnostic curettings, we would know how long the carcinoma had been growing in that uterus.

Of course, no one is going to let a discovered carcinoma continue growing in a human uterus to determine the changes of cell type. But we have a hint in the direction of such progressive cell changes in those cases in which a curetting shows endometrial hyperplasia and a second curetting after a year or two shows endometrial carcinoma. Another hint is the finding of different cell types in the same tumor. In one of our cases of corpus carcinoma, a single microscopic field showed pathologic Grades 1 and 4. In another case, the uterus was double and one horn showed endometrial hyperplasia and the other horn showed endometrial carcinoma. Perhaps some information on this point of progressive changes through different cell types and arrangement could be obtained by animal experimentation with inoculated uterine carcinoma.

Special Examination Methods.—A gastrointestinal x-ray series may furnish valuable help in establishing or disproving intestinal invasion in a suspicious case. It is well to take a preliminary plain plate for a check, as it may show some gland calcification or other calcification which might be misleading later. Also, the plain plate may show dim indications of tumor outline or density. Cystoscopic examination is advisable in cases of suspected bladder or ureteral involvement, and may provide information as to whether the association is cancerous invasion or only pressure by the mass.

Outlining of the uterine cavity by x-ray visualization with opaque material will show the distortion and irregularities of the cavity and

the masses projecting into it. However, such injecting of the cavity carries the danger of spreading the carcinoma to the peritoneal cavity through the tubes, and hence should not be used. Most of this information can be obtained during the curettage by careful use of curette-palpation, without the danger of spreading the carcinoma through the tubes. Uteroscopy with special endoscopic tubes has been used in these cases, but the conditions in the uterus make the field of vision limited and unsatisfactory. Most of the information thus furnished may be obtained incidentally in the curettage, making unnecessary this additional instrumental disturbance in the uterus.

CONCLUSIONS

There is presented here a definite and complete clinical classification of cases of carcinoma of the corpus. The grouping is into six stages, each stage representing an extent of involvement within fairly definite anatomic limits. The limits are capable of recognition and easy designation by the combination of operative and laboratory examinations. Stages III, IV, V, and VI may ordinarily be recognized at operation and Stages I, II, III, and IV may be recognized in the laboratory. The laboratory examination may identify even Stage V by critical examination of the gross specimen and selection of blocks at its margin where the cancerous extension to irremovable tissue was cut across in the operation.

Each stage has also a clinical significance of its own, bearing on treatment or prognosis. In Stage I, the prognosis is practically 100 per cent curable. The growth is so superficial that it has occasionally been removed by the diagnostic curettage. Radium treatment will almost certainly eradicate it, though of course x-ray therapy should be added on the general principle that there may be scattered cancer cells in the pelvis. As radium would eliminate the remnants of carcinoma remaining after the diagnostic curettage in Stage I, operation for removal of the uterus would not be needed if we could identify this stage with certainty. However, this stage cannot be distinguished from Stage II until the uterus is removed and sectioned. Consequently the treatment employed must be suitable also for Stage II, i.e., for invasion of the muscular wall, which means operative removal of the uterus in addition to radiation.

In Stage II the prognosis is still excellent with thorough radical treatment, which embodies widespread radiation plus radical operation. If in the preoperative examination there is no palpable enlargement of the uterus and no superficial tenderness, we are justified in assuming that the growth is still within the second stage, and may encourage the family accordingly.

In Stage III there should be distinct enlargement and irregularity of the uterus appreciable on examination. If the process has extended to the peritoneum, superficial tenderness of the corpus is present, and

sometimes there is spontaneous pain from the area of local peritonitis. There may be some fixation of structures by peritoneal exudate involving intestinal or bladder wall. The prognosis is still good, provided radical treatment is employed promptly before the carcinoma cells penetrate the adhesions into intestinal or bladder wall.

In Stage IV there is carcinomatous extension beyond the uterus, but only in the broad ligament areas with possible involvement of ovaries or tubes. As these structures are removed in the regular radical operation the prognosis is still fair, though extensive broad ligament involvement naturally suggests the possibility of fine nonpalpable lymphatic extensions beyond. Intestinal adhesions are not of serious significance unless cancer cells have penetrated into them, and if they have so penetrated that puts the case in the next stage.

In Stage V the carcinomatous extension may be into an adherent intestinal coil or an adherent area of bladder wall, or it may be along the lymphatics into the deep structures of the pelvic wall. Resection of an intestinal coil or an involved area of bladder wall is, of course, possible, but under the circumstances it is not ordinarily advisable. Such palpable extension means usually deeper nonpalpable extension, for the eradication of which dependence must be placed on deep x-ray therapy, and it is well to depend on the radiation to take care also of the palpable visceral wall involvement. The additional chance of cure, if any, by resection is not sufficient to warrant the additional serious operative work, with its mortality and morbidity risks.

The plan of treatment in Stage V is to remove the main mass of tumor tissue by removing the uterus and adnexa. By this removal of the tumor, pressure symptoms are relieved and also the patient is given a better chance of cure or protracted relief by the x-ray therapy, because only scattered remnants of carcinomatous tissue remain to be dealt with. In this stage in which cancerous extensions must be left, supravaginal hysterectomy is usually preferable to complete, for the cervix is rarely involved, though occasionally circumstances may make the additional work for removal of the cervix advisable.

In Stage VI the definite distinction from the preceding stage is made at operation after the abdomen is open. Careful palpation all around the tumor and tentative attempts at separation of adhesions here and there, finally make it clear that the adhesions are carcinomatous instead of simply inflammatory and that the involvement is so extensive that safe removal is impossible. In such cases an attempt at enucleation is very likely to start uncontrollable hemorrhage. One or more specimens are excised from characteristic areas, with care to avoid bleeding which cannot be easily controlled by suture. In this stage the prognosis is of course bad in regard to cure, but deep x-ray therapy may control the growth sufficiently to keep the patient in fair comfort over a long period.

In all the stages, the combination of radiation treatment and operation is advisable, provided the patient is a good operative risk. In a handicapped patient thorough radiation is to be employed, and the addition of operation is to be considered along with the extent of the handicap. In such a case the additional risk of operation must be carefully balanced against the chance of cure by radiation alone. In Stages I, II, III, and IV, where there is still a very good chance of complete removal of all carcinomatous tissue, the additional chance of cure given by operation justifies taking considerable handicap risk. If we could before operation identify the strictly first-stage cases, it might be advisable to depend on radium and x-ray treatment to cure them. But as previously explained this distinction cannot be made till the uterus is out and sectioned, hence the treatment must be such as will be safe for deep extension into the muscular wall. In Stage V the definite diagnosis of carcinomatous extension to irremovable structures cannot be made till the abdomen is open, consequently operation is strongly indicated on the possibility that complete removal may be carried out. In Stage VI the preoperative diagnosis cannot exclude the possibility of removal of the main tumor mass, with corresponding benefit to the patient. Consequently even in late cases the chance of relieving pressure pains or prolonging life warrants taking considerable handicap operative risk.

In some of these complicated cases the poor general condition is due largely to anemia from the uterine bleeding. When the bleeding is stopped by curettage and radium treatment, the general condition of such a patient may improve sufficiently to remove the contraindication to operation. So the decision against operation in a handicapped patient is not necessarily permanent, for conditions may improve sufficiently later to make operation advisable.

In those cases in which the contraindication to operation is some serious continuing disease, the outlook for the patient is still far above the hopelessness of former times. In an encouraging percentage of these patients submitted to thorough radiation with radium and x-ray, the carcinoma has been cured, and this percentage is increasing with the increasing effectiveness of deep radiation and the increasing accuracy of its application to corpus cancer.

Six stages may at first thought seem a rather large number. It seemed so to me, and I studied a good deal trying to reduce the number. But carefully considered from the standpoint of accurate definition of each stage and the classification's usefulness in clinical and laboratory work, the six stages were found necessary. A reduction in number by combining any two of them was unsatisfactory. For example, if Stage I included I and II and the operator received a laboratory report stating "Corpus carcinoma, clinical Stage I," he would at once wish to know whether or not it had extended to the muscular wall, because of the difference in clinical significance. If

Stage II were extended to include all muscular involvement, neither the clinician nor the pathologist would be satisfied with that broad designation, for each would wish to have stated clearly whether the cancer involved only a small part of the muscular wall or extended into the outer half. The same objection applies to any combination of two stages, and still more to any combination of three. Careful critical study of the six stages in practical application to clinical and pathologic work shows that each stage represents a definite step in the progress of the cancerous infiltration and is of importance to the clinician in treatment and prognosis.

Accurate records are necessary to reliable statistics. Accurate recording starts with the patient's history and extends through all phases of the conduct of the case. It is only thus that case records can be made valuable in assisting the physician in the selection of the best treatment for his succeeding cases and in furnishing published statistics from which reliable conclusions may be drawn. In the cases now under consideration, an important feature is the accurate recording of facts indicating the stage or extent of the growth. For this purpose attention must be given to careful examination and recording of findings before operation and then of gross findings during operation (including any disturbance or surrounding structures that may or may not be dependent on the uterine growth) and then of gross findings after operation in the examination of the specimen in the operating room and then of gross findings in the laboratory, where the specimen is divided in a systematic way and prepared for microscopic investigation.

Valuable information is often missed by failure to examine carefully or record accurately at one or more of the above mentioned phases of the case. There is an inclination on the part of the surgeon to depend on the laboratory report for all recorded information about a removed tumor, whereas its location and relations and attachment as determined during operation are important items, as are also its size, shape, color, and consistency before these are changed by the manipulations of operative removal or by incisions for inspection after removal.

We are engaged in the serious and difficult business of saving life, and for the solution of the intricate problems encountered, we need all the help we can secure by careful observation and accurate recording of findings in the various phases of these cases. And yet the opportunities for such observation and recording are often permitted to slip away, sometimes even without recognition. A city detective bureau which handled its opportunities as carelessly would not get very far in the detection of crime. We must seize every opportunity for observing and recording clews which may assist in the solution of our serious problems.

UNIVERSITY CLUB BUILDING

A REPORT ON RADIATION TREATMENT OF CANCER OF THE CORPUS AND CERVIX UTERI FROM THE BROOKLYN HOSPITAL*

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WE HAVE been using radium in the Brooklyn Hospital for the treatment of uterine cancer since Jan. 1, 1921. In the series covered by this report, all were treated prior to Dec. 31, 1929, so that more than five years have elapsed since treatment was instituted. In the nine years, we have treated 36 patients with cancer of the corpus, and 100 patients with cancer of the cervix uteri. Ward and private patients have been included in this report, and there have been several different operators.

In all of these cases the radium salt was used, contained in two 50 mg. capsules. The screens were a glass capsule containing the radium, a second capsule of platinum 1 mm. in thickness, and a rubber tube 2 mm. in thickness. One millimeter of platinum absorbs all the primary beta rays, and the emergent secondary beta rays are absorbed by the 2 mm. rubber screen, so that our patients have received only gamma rays. We are indebted to the late Dr. Harold Bailey of New York for the suggestion that we use 1 mm. of platinum as a screen, and that by so doing we would probably avoid some serious injuries.

Our general plan of treatment for carcinoma of the corpus was to do a diagnostic curetting and insert the radium capsules in tandem high up in the uterine cavity. The cervical canal and vagina were then packed with dry gauze. The initial radium dose was 2,400 mg. hours.

If the microscopic diagnosis on the curettings was reported as malignant, if the disease was clinically rather early, and if the patient was a proper operative risk, she was subjected to a total abdominal hysterectomy six weeks after radiation. The uterus was then studied microscopically to substantiate the diagnosis. If the disease was far advanced or if the patient was not a proper operative risk, she was not subjected to a hysterectomy, but was treated with a second or a third dose of radium within the uterine cavity.

In reviewing this material, great care has been exercised to include only cases in which a definite carcinomatous process was proved by careful histologic examination. In the instances in which the diagnosis was made from examinations of curettings, they were uniformly of sufficient bulk to insure that a genuine neoplastic process existed.

*Presented at a meeting of the Brooklyn Gynecological Society, November 6, 1936.

In the great majority of cases in corpus carcinoma, the uteri were subsequently examined and the findings in the curetted material were confirmed. No doubtful cases and none of adenoma destruans have been included, even though they have had radium treatment and a total hysterectomy, because we do not consider this to be a real cancer case.

Grade	I	Superficial papillary adenoma malignum
Grade	II	Adenoma malignum
Grade	III	Adenocarcinoma
Grade	IV	Diffuse (anaplastic) carcinoma

In this analysis of corpus carcinoma cases we have used the following classification of Mahle, later confirmed by Healy.[1] This classification has lately been used by Newell and Crossen[4] in their report on corpus carcinoma.

In explanation of the above classification as employed in this report it may be stated that tumors, classed as superficial papillary adenoma malignum, have uniformly been diffuse forms of the disease, and no examples of the circumscribed lesion have been encountered.

RESULTS

The corpus carcinoma group consists of 36 cases. Complete follow-up data are available in 31 cases, and 5 patients are untraceable. The follow-up percentage is therefore 84 per cent.

Twelve of the patients lived five years or over, and 24 did not live five years, or were untraced. The five years salvage, therefore, is 33.3 per cent, and the mortality is 66.7 per cent.

A study of the 24 patients who died under five years shows that 5 patients are not traceable. Of the remaining 19 patients, one died two days after hysterectomy from acute cardiac dilatation, and another patient died seven days after operation from general peritonitis. This was one of the first cases in the series, and the hysterectomy was done ten days after radiation. A third patient died in nine days from embolus.

The primary mortality, therefore, is 8.33 per cent. Of the remaining 16 patients, 6 were hopeless. They had one radium treatment with or without x-ray treatment, and died within ten months. The remaining 10 patients were advanced cases and lived from one to three and one-half years. Five of these had radium alone, 4 had radium and hysterectomy, and 1 had radium and an exploratory laparotomy. The pathologic diagnosis on these 19 deaths were advanced adenocarcinoma, with the exception of one case which was a myosarcoma.

A study of the 12 patients, who lived for five years or more, reveals that two died six years after radiation alone, and 1 is living eleven years after radiation alone. Three patients are living twelve years after radiation and total hysterectomy, 1 nine years after, 4 are living eight years after, and 1 patient is living and well, fourteen years after radiation and hysterectomy.

In this group, 9 had radium and hysterectomy, and 3 had radium alone. Of the 3 patients who had radium alone, it is interesting to note that one patient had three doses of radium totaling 7,200 mg. hours, and died of carcinoma six years after the first treatment. Her pathology was adenoma malignum (Grade II).

Another patient had four doses of radium totaling 7,200 mg. hours, and died of carcinoma six years after the first treatment. The pathologic diagnosis was adenoma

malignum (Grade II). A third patient was treated in 1924 with a 2,400 mg. hour dose of radium. Eight years later, in 1932, she showed signs of recurrence, and she was given a second 2,400 mg. hour dose. She is still living and well. She likewise had an adenoma malignum (Grade II).

The pathology in this group of 12 five-year cures is as follows:

5 Superficial adenoma malignum	Grade I
5 Adenoma malignum	Grade II
1 Adenocarcinoma	Grade III
1 Diffuse carcinoma	Grade IV

A comparative tabulation of carcinoma of the corpus cases with five-year cures is as follows: Memorial Hospital,[6] 85 per cent; Henry Ford Hospital,[9] 61 per cent; Washington University Hospital, St. Louis,[4] 52 per cent; the Brooklyn Hospital, 33.3 per cent; and Department of Health, Cancer Division, Detroit,[10] 28.6 per cent.

From Jan. 1, 1921, to Dec. 31, 1929, we treated 100 patients with cancer of the cervix. We have followed 79 patients, and 21 are untraced, so that our follow-up is 79 per cent.

In this group we have 12 patients who lived five years or more after treatment, so that our five-year salvage is 12 per cent. We have 8 patients who died between three and five years after treatment, 33 who died between one and three years, 26 who died under one year after treatment, and 21 are untraced, so that our mortality is 88 per cent.

In the group of 12 five-year cures, the cancer was of the epidermoid variety, except in one case which was a basal cell carcinoma. There was one Grade II, 9 were Grade III, and 2 were Grade IV. Only two of the patients received x-ray treatment.

Five of this group were subjected to a Byrne cautery operation, leaving only one and one-half to two inches of the corpus uteri in place. One 50 mg. radium capsule was then placed in the remains of the uterine canal, and a second 50 mg. capsule was placed crosswise in the crater. The initial dose of radium was 2,400 mg. hour.

Two of these five patients received a second radium treatment, and one of them had x-ray treatment in addition.

In order to do a Byrne cautery operation, the uterus must be movable. If the cervix is fixed by extension of the disease, it cannot be pulled downward and the procedure is impossible.

Three of these patients treated by the Byrne operation and radium had secondary hemorrhages about ten days after. Two are alive and well, one died six years after the operation from an anginal attack. Her pelvis was in excellent condition at the time of her death.

One of these patients has a vesicovaginal fistula a few months after her second radium treatment. No attempt has been made to repair it.

One patient had a cautery amputation of the cervix immediately prior to her treatment with radium. Only one inch of the cervix was removed, so that the amputation cannot be classed as a Byrne operation.

Six of the group received radium alone, and in one, x-ray was given in addition to radium.

Two of them had only one radium treatment, and four received more than one treatment.

In this group of six patients, there was too much fixation of the uterus to attempt to do a Byrne operation.

Of the three patients treated by radium and a Byrne operation, one lived two years, one lived one and one-half years, and the third was untraced. Of the two patients treated by radium followed by total hysterectomy, one was given 3,600 mg. hr. of radium in 1923, and three months later a total abdominal hysterectomy was

done. There was a recurrence in the scar of the vault of the vagina three years later, together with metastasis in the ilium. She was then given x-ray treatment but she died one year later.

The second patient received 2,400 mg. hr. of radium in 1925. A total abdominal hysterectomy was done two months later. This patient lived two years.

Of the three other patients in this group who had x-ray, one was treated by cautery, radium, and x-ray treatment. She lived four years.

This patient developed a vesicovaginal fistula which was repaired at the Woman's Hospital in New York two years after her initial treatment. The fistula remained healed for about one year, then it opened as the disease began to progress rapidly.

A second patient had cautery, radium, and x-ray treatments and lived two years. The third patient was treated with radium and x-ray. She lived nine months.

The patient who developed a rectovaginal fistula had an advanced epidermoid carcinoma. Her cervix was coned out with cautery, and she was given 3,850 mg. hr. of radium in two doses. She lived two years.

The incidence of cancer in the stump of the cervix in our series was as follows:

1. Supravaginal hysterectomy for fibroid twenty-one years before. Given radium and lived one year.

2. Supravaginal hysterectomy for fibroid twenty years before, given radium, untraced.

3. Supravaginal hysterectomy for fibroid fifteen years before. Lived one year after radium.

4. Supravaginal hysterectomy for fibroid fourteen years before. Lived one year after radium.

Incidence in our series, 4 per cent; mortality 100 per cent.

It is interesting to note that Healy[1] finds that the incidence of carcinoma of the cervical stump at the Memorial Hospital in New York is 2.6 per cent, and that his five-year salvage is 14 per cent.

Von Graff[2] has published a comprehensive report on this subject from a collected series of 4,269 patients with cervix cancer. He found an average incidence of stump cancer to be 4.1 per cent. He makes a plea for total hysterectomy, instead of supravaginal hysterectomy, as a prophylactic measure.

Pearse[3] contends that the possibility of carcinoma developing in the cervical stump should not be considered as an indication for total removal of the uterus, unless the mortality for the total hysterectomy can be shown to be the same as it is in the supravaginal operation.

Healy[1] states: "The low incidence of stump carcinoma does not justify risking the increased mortality of total hysterectomy instead of the subtotal operation to prevent the later occurrence of cervix cancer in all patients from whom the uterine corpus is to be removed."

A comparison of five-year cures in the patients with carcinoma of the cervix, in our series with the results in other hospitals is as follows: Henry Ford Hospital,[9] 32 per cent; Woman's Hospital,[5] 25.8 per cent; University of Pennsylvania Hospital,[11] 25.1 per cent; Washington University Hospital,[12] 23.9 per cent; Memorial Hospital,[13] 22 per cent; Jefferson Hospital,[8] 18.4 per cent; Department of Health, Cancer Division, Detroit,[10] 13.2 per cent; and the Brooklyn Hospital, 12 per cent.

The five-year cures in this series of cases of cancer of the corpus and cervix uteri are considerably lower than the five-year cures reported by several other institutions.

Several of our patients had clinical symptoms of cancer. They were treated for it and are alive and well, but they are not included in this report because the diagnosis was not substantiated by the microscope.

The cases covered by this report have received only gamma rays from two 50 mg. capsules of radium. The initial dose was 2,400 mg. hr., followed by one or more doses. Only a very few cases have had bladder or rectal injury.

Our present plan for treatment of carcinoma of the cervix is:

a. A diagnostic biopsy, so that we may know the type of disease and its radiosensitivity.

b. An x-ray cycle consisting of 4,800 to 7,200 r. units, screened by ½ to 2 mm. of copper with a distance of 50 to 80 cm. through 4 to 6 ports. The daily dose is 200 to 300 r. units through two ports. The total number of daily treatments covers a period of two or three weeks.

c. Ten days later the patient is treated with 3,600 to 4,800 mg. hr. of radium at one treatment within and around the cervix. The screening is 1 mm. of platinum and 2 mm. of rubber.

Carcinoma of the corpus is treated by a diagnostic curettage, and a 2,400 mg. hr. dose of radium within the uterine cavity. An x-ray cycle follows, and if the patient is operable, a complete hysterectomy is done six weeks later. If the patient is inoperable, radium and x-ray treatments may be repeated in six weeks or two months.

The question of radium and x-ray dosage is in a state of flux. The treatment of yesterday is obsolete, and that of today will probably be changed in the future.

Research institutions for the treatment of cancer are justified in using large doses of radium and x-ray, because they must lead the way in the treatment of this disease. I feel very strongly, however, that the general hospital is not justified in using such large dosage until the treatment has become standardized. The late effects of these large doses of radium and x-ray are too serious. I am convinced that it is better to cure a smaller number of cancers than to have a larger percentage of cures and many patients who are invalids from fistulas and damage to the abdominal organs.

A majority of the advanced cancer patients will die soon enough from the disease, without these serious added complications.

The Byrne cautery operation has been an excellent adjunct to our radium treatment of cancer of the cervix. It is only applicable, however, to the very early case, that is, to the case when there is no fixation of the uterus. So few of the cases are early ones, that the Byrne operation has a very limited field.

In this small series of cases, the disease has been far advanced before the patients presented themselves for treatment. I make a plea for more and more education of the public and physicians, so that the patients may learn to consult their physicians at the first symptoms of the disease, and the physician may learn to recognize the condition as early as possible, or if in doubt, send the patient to an institution where a competent diagnosis may be made.

It would be of great benefit to cancer patients if each hospital treating this disease would organize a tumor clinic along the lines suggested by the American College of Surgeons. The patient would then be under the observation of the same group of men in the outpatient department, the ward, the operating room, and in the follow-up clinic.

The drawback to the plan, however, is that it takes these patients out of the general ward service, and far fewer doctors are trained in the observation and treatment of cancer.

I contend that all doctors must be trained to recognize cancer in the early stages. To this end, I suggest that each gynecologic service should have one clinician trained in the treatment of cancer who would be constantly in charge of the service cancer cases.

The pathologist and radiologist would work with him.

The other members of the gynecologic staff would serve as active workers in the group for a definite period of rotation. In this way, the patients would benefit from being constantly under the observation of a cancer expert, and all the staff would benefit from a period of observation of cancer and a study of its treatment.

The clinician in charge of such a group must, of course, be interested in the treatment of cancer. His continuous observation and care of the cancer patient would be far more valuable than the "hit or miss" plan of allowing the patient to be treated by the staff member who happened to be on service. Likewise his teaching of internes and staff members would be invaluable.

I am of the opinion also, that the doctor in charge of a private patient would be only too glad to consult this group of specialists in regard to the treatment of his patient, and that he would follow their suggested plan of treatment.

The statistical study of cancer would be much more valuable if all observers followed the same standards of tumor grading.

I have recently learned that members of the American Urological Society may send slides to the Surgeon General's office at Washington for grading. This is a step in the right direction, and in the near future I hope that gynecologists may all follow a similar standard of tumor grading.

Radiosensitivity is still something that depends too much on the personal equation of the pathologist to be of great value. It is possible that in the future much more may be known about it; then perhaps, the radiosensitive tumor may be treated by radium and x-ray, and the radiononsensitive tumor may be treated by surgery. I think, however, that only those men who are able to do master surgery can ever hope to cure cancer by this means.

I am greatly indebted to Dr. James W. Denton, who has graded all the sections, and to Mrs. Hallock, who has done so much of the follow-up work.

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DISCUSSION

DR. WILLIAM A. JEWETT.—When the reports from five clinics in different parts of the United States give five-year cures of carcinoma of the body of the uterus varying from 85 per cent to 28.6 per cent, and reports from eight clinics show a difference of from 32 per cent to 12 per cent in five-year cures in carcinoma of the cervix, all of them presumably following about the same line of treatment, it is evident that there is need for greater uniformity in the method of compiling statistics, in the standards of tumor grading and for a widespread improvement in our methods of follow-up. Dr. Smith is to be congratulated on his success in having kept track of over 80 per cent of his cases. In a recent review of my own personal cases I was less fortunate and was able to obtain but a little over 50 per cent of the end-results. This poor showing was due in part, I believe, to the fact that my patients were not all cared for in the same institution, and to the further fact that many of my cases, being referred cases, were returned to their own physicians, and from whom, for one reason or another, it was impossible to obtain a satisfactory account of the subsequent history. If the calculation of the percentage of five-year cures is based on the number of definitely followed-up cases, it will give a much higher figure than will be found if the untraced patients are assumed to be dead, as Dr. Smith has done in his report. Unless the same method of procedure is followed out universally, it is impossible to evaluate one's own results of treatment by comparison with the figures of others.

When different methods of grading of the tumors are practiced, Smith's suggestion that gynecologists throughout the country adopt a uniform scale is a good one.

The problem of providing a satisfactory workable follow-up system is difficult and likely to involve the expenditure of a considerable amount of money if it is to succeed. Still it is important for we must know the results of our particular type of treatment as well as the results obtained by others if we are to give our patients the best possible care and if we hope to salvage a larger number of those who are afflicted.

Smith has spoken of the great benefit to cancer patients if each hospital treating this disease should establish a tumor clinic along the lines suggested by the American College of Surgeons. I am heartily in accord with this suggestion provided the hospital is equipped with the necessary amount of radium and has an adequate x-ray therapy machine. Such a tumor clinic has been organized at the Caledonian Hospital and has been functioning for several months. The sessions are held once a week, and there is present a representative of each of the major departments of the hospital—the pathologist, the roentgenologist and a stenographer. The patient is presented by his own physician, is examined by a number of those present, and after he has retired there is a general discussion of the problem presented and a course of treatment is outlined. So far there have not been many cases of pelvic cancer, and naturally it will be a long time in such a young clinic before any statistics are available; but I mention the working of this clinic to show that not "fewer doctors" but more doctors are being trained in the observation and treatment of cancer.

My method of applying radium has been similar to the one described except that instead of screening the radium with 1 mm. of platinum and 2 mm. of rubber I have used ½ mm. of silver, 1 mm. of brass, and 1 or 2 mm. of rubber. Dr. Smith has made use of the Byrne cautery operation in a considerable number of his patients; a procedure that I have not used at all, and he has made less use of the x-ray therapy than has been our custom. However, I note that his present plan of treatment of carcinoma of the cervix includes an x-ray cycle prior to the application of radium. Our system of grading tumors is the same as that used at the Brooklyn Hospital, and I find about the same proportion of cases falling in each group. In one of our fundal cases we found both a papillary adenoma malignum and a sarcoma.

DR. CAMERON DUNCAN.—At the Kings County Hospital, we take care of these cases in the Gynecological Service, a system which has, I think, certain advantages.

X-ray and radium are combined now in most clinics, but I believe that there is a certain field where surgery should be added. Taussig has shown this in a number of lymphadenectomies. The reduction of the blood supply, and the lymphatic block might be of advantage in a good many cases.

The clinical stage in relation to the pathologic grades is highly important. For example, a clinical Stage I of carcinoma of the cervix, with only a small portion of the cervix involved, has a much better chance than a Stage II or Stage III case where it is beginning to spread to the parametrium, regardless of the pathologic grading. A case that is absolutely radioresistant, that is, if the lesion does not melt away from the cervix within two months' time after the initial radiation, and if the disease has not spread too far, is, I believe, one in which radical surgery is indicated.

DR. SAMUEL L. SIEGLER.—In the Gynecological Clinic of Dr. Jacob Halperin at the Brooklyn Woman's Hospital, we insist on a routine endometrial biopsy of all cases of menstrual dyscrasia. In the last two months, two young women who presented themselves, complaining of sterility and menstrual disturbances, were found as a result of endometrial biopsy to have an adenocarcinoma of the fundus of the uterus. Both patients were in the early thirties, one twenty-nine, and the other thirty-two years of age.

I would strongly urge the adoption in gynecologic clinics of frequent endometrial biopsies on all patients who present some menstrual disturbance. The procedure is a simple one and the result will amply justify the little pain that it may cause the patient.

DR. WILLIAM SIDNEY SMITH.—In answer to Dr. Duncan, I may say that we did not make any clinical groupings of these cases, but I believe that it might be very valuable.

I wonder if the secret of the treatment of cancer in the future may be that some one will discover more about radiosensitivity. If they do, it is quite possible that the radiononsensitive tumor may be turned over to the surgeon, and the radiosensitive tumor may be treated by radium and x-ray. That plan may have possibilities for the future, but at present we do not know enough about it.

Not so long ago I was listening to some reports of cancer from a well-known institution. The five-year cures were rather high. Later, a slide was put on the screen showing the damage that had been done to these patients, and the number of vesicovaginal fistulas, rectovaginal fistulas, and abdominal damage which had occurred. The damage was tremendous. In other words, while they may have had a large number of cancer cures, there were certainly a large number of wrecked patients.

ORAL PARALDEHYDE ADMINISTRATION IN OBSTETRICS

Supplementing Pentobarbital and Pantopon as an Analgesic and Amnesic in Labor

A Preliminary Report of 50 Cases

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RECENTLY there have been many reports in the literature advocating the use of paraldehyde for the relief of pain during labor, the method of administration being per rectum.[1, 3-7] We have used paraldehyde rectally in this clinic for nearly two years, the technic differing from that of Colvin and Bartholomew[3] only in that sodium pentobarbital was substituted for sodium amytal because it seemed to cause less excitement. A careful study of these cases would tend to show that paraldehyde in combination with one of the barbiturates is superior to any other method of obstetric anesthesia and analgesia. The possibility of oral administration was investigated in order to avoid the disadvantages of the rectal route among which were: (1) the difficulty of placing the drug above the presenting part; (2) the tendency of the patient to expel the preparation; (3) the comparatively slow absorption time; and (4) the inadvisability of doing rectal examinations following medication. A review of the literature revealed no experimental work along this line.

The principal task to overcome before paraldehyde could be administered orally was to mask the disagreeable odor and to make the preparation as palatable as possible. The Department of Pharmacology was consulted and they suggested mixing the active ingredient with propylene glycol, alcohol, and syrup of acacia.

Propylene glycol has commanded comparatively little or no interest in medicine. Experimentally[9] it has been studied in animals and proved to be absorbed, and to give rise to additional glycogen storage in the liver. Toxic effects were noted only when enormous quantities (the equivalent of 2 pounds daily for a 70 kgm. man.) were given. The toxicity apparently comes from pyruvic and lactic acids, intermediary products of oxidation. Propylene glycol, $CH_3-\overset{H}{\underset{H}{C}}\overset{}{O}-CH_2-OH$, in its pure form is colorless, odorless, and has an acrid and sweetish taste. It is miscible with water, glycerol, methyl and ethyl alcohols, acetone, ether, chloroform and ethyl acetate. Paraldehyde is very soluble in propylene glycol and at the same time

its taste and odor are masked. The syrup of acacia with its pleasant vanilla taste holds the foregoing in suspension. The ethyl alcohol is added to increase the solubility of paraldehyde in the glycol.

Paraldehyde, the active agent for amnesia, enjoys a wide margin of safety between the toxic and therapeutic doses (a case has been reported[3] where a genitourinary patient received 8 ounces from a misinterpreted order for 8 drams with recovery following nineteen hours of deep sleep). Knoepfel[2] states that it is a safe and promptly acting hypnotic hindered only by its unpleasant taste and odor on the breath. Six to 9 drams is the usual rectal dose in labor and after experimenting 5 drams was found to be the most satisfactory dosage for oral administration.

TECHNIC

Throughout the first stage of labor all of the patients were kept comfortable with sodium pentobarbital (gr. 1½ to 7½) and pantopon (gr. ⅙ to ⅓). We have always considered these to be excellent sedatives for the first stage of labor and have considered them, as have Rosenfield and Davidoff[1] in the original work, as necessary adjuncts in the preliminary preparation for paraldehyde. Patients can usually be quieted by this method, and it is only when delivery is becoming more imminent and pain approaching intolerability that paraldehyde is resorted to. We do not feel as the original workers later report[4] that 6 to 11½ gr. of the pentobarbital of sodium is advisable. We found that the average dosage of 3 or 4½ gr. of sodium pentobarbital and ⅙ gr. of pantopon was satisfactory.

Patients always met the following criteria before the paraldehyde could be given: (1) Regular contractions with a frequency of less than five minutes, (2) contractions lasting forty seconds or more, (3) cervix thinning out and dilating to 3 or 4 cm. in the multigravida and 5 to 6 cm. in the primigravida, (4) the head descending well into the pelvis, and (5) delivery apparently imminent in three or four hours.

A solution of 50 per cent paraldehyde, 40 per cent propylene glycol, and 10 per cent alcohol (90 per cent) was made up and stored in a refrigerator as was the syrup of acacia (N.F.). Ten dr. of the paraldehyde-glycol mixture (equivalent to 5 dr. of paraldehyde) were briskly stirred with 20 dr. of the syrup of acacia immediately before administration. The patient was told she was to receive a syrup that would produce sleep. The nares were loosely plugged with pledgets of cotton and the patient asked to swallow the half glassful of syrup quickly. This was followed by a few swallows of water and the patient allowed to recline. The cotton was then removed from the nose.

EXPERIMENT

The 50 cases studied represent practically consecutive admissions to the ward of patients that were early in the first stage of labor or were hospitalized before labor commenced. Of the 50 cases 37 were primigravidas and 13 were multigravidas. Eleven of the patients were private patients and 39 were free ward patients. Distribution between the colored and white race is shown in Table I.

TABLE I

	PRIMIGRAVIDAS	MULTIGRAVIDAS
White	26	11
Colored	11	2

The ages ranged from a fifteen-year-old colored primigravida to a thirty-eight-year-old white multigravida. The average age for the group was twenty-three years.

In this series of cases one observes considerable pathology, as in this clinic abnormal patients are received from many sources. The various complications have been outlined in Table II.

TABLE II

COMPLICATIONS	NO. CASES
Preeclampsia	8
Nephritic toxemia	2
Condyloma acuminata	1
Elephantiasis vulvae	1
Active syphilis	1
Cardiac	1
Breech presentation	2
Twin pregnancy with hydramnios	1
Acute yellow atrophy of liver	1
Postpartum hemorrhage	1
None	31
Total	50

The cervix at the time of paraldehyde administration averaged 6.25 cm. (minimum of 4 and maximum of 7) dilatation in the primigravidas, and 4.75 cm. in the multigravidas (minimum of 3 and maximum of 6). The station of the presenting part varied from low to midpelvis.

It is routine in this clinic upon all primigravidas to do an elective low forceps and episiotomy when the head reaches the perineum and the cervix is completely dilated. The type of delivery is shown in Table III.

While it is true that with the increase in the use of obstetric analgesia, there has been a corresponding increase in obstetric operations[8] and a rise in maternal mortality and morbidity, we believe that these are both unnecessary, and that spontaneous delivery is just as pos-

TABLE III

METHOD OF DELIVERY	NO. CASES	
Low forceps	35	
Spontaneous	10	
Midforceps including 2 manual rotations of head	4	
Breech extraction	2	
Total	51	(1 set of twins)

sible when the patient has been made comfortable with paraldehyde as when nothing is used. On the other hand, it has been proved very conclusively that episiotomy and outlet forceps in competent hands decrease rather than increase the risk to both mother and child. Supplemental anesthesia was used as shown in Table IV.

TABLE IV

ANESTHESIA	NO. CASES
Nitrous oxides	35
Local infiltration	4
Ether (cardiac)	1
None	10
Total	50

Additional operations at the time accounted for the increase of supplemental anesthesia. All cervices were inspected routinely and all multigravidas had an elective posterior repair of the outlet. Spontaneous deliveries and minor repairs of perineal lacerations require no supplemental anesthesia.

TABLE V*

OPERATIONS	NO. CASES
Elective trachelorrhaphy	18
Elective perineorrhaphy	11
Episiotomy	35
Repair of third degree laceration	1
Hysterostomatomy	1

*Oral paraldehyde was used for a low cervical section as a basal anesthesia in a patient with cephalopelvic disproportion and fulminating preeclampsia with good results, but this case is not included in the series.

RESULTS AND DISCUSSION

The disagreeable taste and odor of oral paraldehyde were satisfactorily disguised. Forty of the patients stated that this was an entirely new-tasting medicine and not unpleasant; the other 10 complained of bitterness, sweetness, or a slight burning sensation.

The absorption time was rapid by oral administration in contrast to the rectal method. Memory fled in five to ten minutes after the preparation was swallowed. No great variations in time of absorption were

noted. Rectal variations are probably due to depleted circulation of the lower bowel by the encroaching head. It was not necessary to avoid noise and motion to produce sleep as was the case with rectal paraldehyde.

Complete amnesia, the desirable objective during labor, was present in 94 per cent of the cases. The primigravidas averaged two hours and thirty minutes without memory before delivery (a maximum of seven hours and minimum of thirty minutes). The multigravidas averaged one hour and fifteen minutes of amnesia prior to delivery (a maximum of four hours and a minimum of thirty minutes). Analgesia even with partial amnesia was obtained earlier by the preliminary medication of all cases.

Amnesia following delivery averaged seven hours for the series. This was of benefit to the new mother for the early uncomfortable hours of the puerperium were passed in sleep. Twelve patients were amnesic for ten hours; 1 patient, along with natural sleep, was amnesic for twenty hours; 3 patients recalled being taken from the delivery table one hour postpartum. Drowsiness with unconcern and disorientation persisted for twenty-four hours in nearly all cases.

Restlessness was present to only a small degree and sideboards were used on the bed but no other special care was given. Cooperation was frequently present with the patient responding to directions and often it was possible to administer postpartum drugs by mouth.

The average duration of labor for the primigravidas was thirteen hours and four minutes with a maximum of twenty-seven hours and a minimum of six hours. The multigravidas averaged nine hours and fifteen minutes, 2 of them having fifteen and seventeen hours of labor due to irregular and vague contractions early in the first stage. The shortest labor was three hours and thirty minutes.

We were unable to measure uterine contractions as did Moore and McCurdy[7] by means of Dodek's hysterograph, but it is quite probable that there was a temporary decrease in the intensity and frequency for the first thirty minutes. This decrease, if present, is compensated for by regular, more intense, normal contractions later. The development of uterine inertia was grossly observed in only one patient. This undesirable relative effect was shown by complete cessation of contractions for a period of four hours and then labor was resumed with delivery three hours later. No pituitrin nor oxytocics of any sort were resorted to prior to delivery. The greatest aid in overcoming uterine inertia is the prevention of it by following the criteria suggested earlier in this paper. Keeping the patient on her back helps to maintain the expected type of labor.

Expulsive efforts of the mother were not abolished and appeared more pronounced in the cases having had the drug for more than three

hours. Since 20 per cent of the cases delivered spontaneously, it clearly shows that this reflex remains present and the drug is efficacious in home deliveries of multiparas where operative intervention is not considered. No special nursing care is necessary, but the patient should be watched throughout her labor. The attendant need only be someone with sufficient ability to keep the patient from rolling out of bed. Restlessness is sometimes present, but we have not encountered any cases of active delirium.

We found no unusual nor unexpected change in the pulse, respiration or blood pressure. The pulse was elevated moderately as shown on Chart 1. The average pulse at onset of labor was 86, one hour before the paraldehyde and at the administration all were below 100 per minute except 2 cases. One hour after the taking of paraldehyde 12 were above 100 (the highest was 140 per minute in a case of prolonged labor). At delivery and one hour postpartum 12 and 18, respectively,

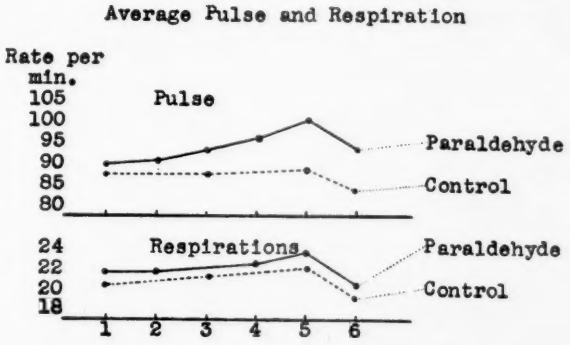

Chart 1.—Pulse and respiration 1, onset of labor; 2, one hour before oral paraldehyde; 3, time of administration; 4, one hour after administration; 5, delivery; 6, one hour postpartum. The control curves represent 50 normal, spontaneous deliveries.

had pulses above 100. The highest pulse was 144 in a case of twins and hydramnios one hour postpartum. All tachycardias seemed to parallel the type of operative or shocking delivery rather than arise from paraldehyde. The average respiratory rate was twenty-one per minute and no cases exhibited depression or poor ventilation as shown in Chart 1.

The blood pressure had a general tendency to fall in patients with systolic above 140 mm. of mercury and a tendency toward elevation for those below 120 mm. of Hg following paraldehyde administration. Two cases of preeclampsia, whose blood pressures were 170/120 and 170/110 at the onset of labor, fell to 140/94 and 160/90, respectively, one hour after the paraldehyde was given. One hour postpartum these pressures were 132/74 and 140/84, respectively. There were but 3 readings below 100. The effect of paraldehyde on patients with normal blood pressure and with hypertension is shown in Chart 2.

The auscultation of the fetal heart during labor in all cases did not present any extraordinary change in rate or rhythm that disturbed the accoucheur. The estimated blood loss for the series in general was not increased. One patient, a twenty-two-year-old primipara, had a postpartum bleeding of 800 c.c. due to a persisting atonic uterus, but had an uneventful recovery.

The failures in this series (6 per cent) were due to vomiting of the preparation. Five patients were previously nauseated and vomited the paraldehyde. Three of the five had a second dose administered and two of them retained it with satisfactory results. Nausea accompanies the latter third of many labors and is an inconvenient feature to handle. After vomiting, many patients are able to retain a small amount, and it is because of this latter fact that we feel a second dose can successfully be given. Rectal paraldehyde can always be resorted to if nausea is extreme. The early administration of bicarbonate of soda aids the stomach in emptying, thereby preparing it for oral paraldehyde.

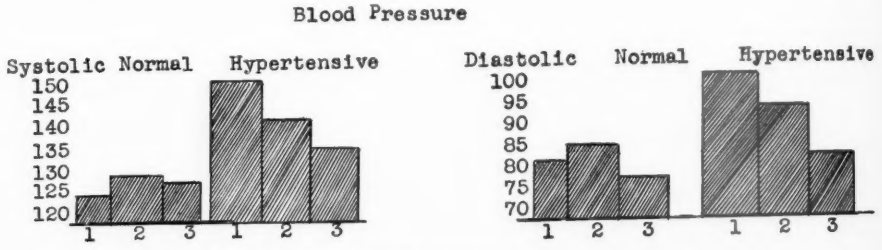

Chart 2.—Effect on blood pressure in 38 normal and 12 hypertensive cases: 1, onset of labor; 2, one hour after paraldehyde administration; 3, one hour postpartum.

One patient in the series had a delayed shock postpartum, from which she recovered but died on the fifth day. The autopsy diagnosis was acute yellow atrophy of the liver, a condition which was not felt to be due to either the paraldehyde or the propylene glycol, but was considered an accidental complication.

There was one stillborn, macerated infant, in a mother with a positive Wassermann. Intrauterine death was discovered before labor and therefore we can disregard it. Two babies required resuscitation. Mucus aspiration was all that was necessary in one; the other baby required artificial pulmonary insufflation for three minutes; both babies were crying healthily in ten minutes. The other 48 babies cried spontaneously on birth and all conducted a lusty neonatal period in the hospital until discharge. Not a single so-called "sleepy baby" was observed.

CONCLUSIONS

A paraldehyde-propylene glycol mixture has been administered orally in a series of 50 cases and has proved to be a successful, simple, non-expensive agent for the relief of pain in labor. A prolonged amnesia resulted which carried no deleterious effects to either mother or infant.

It is realized that with this small series of cases, one cannot give decisive conclusions. A more complete study is now under way.

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THE PRIMIPAROUS INTERNAL GENITALIA AFTER FORCEPS DELIVERY*

A Follow-Up Study of Cervical Lacerations and Malposition

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THE present paper deals with the lesions of the internal genitalia found at follow-up examination six weeks postpartum in 193 ward primiparas delivered by forceps at term and is intended as a companion study to a previous report made to this Society on "The Primiparous Perineum After Forceps Delivery." The statistics are taken from the same group of patients. The purpose is a further attempt to answer the question, "What Price Maternity?" from the standpoint of non-febrile morbidity. In this report the term "internal genitalia" includes the uterus and adnexa.

The number of cases studied is comparatively small. But it is believed that a careful analysis of the available material indicates definite trends. And as such an index serves a useful purpose.

Modern medical literature shows a surprising lack of statistical uniformity in the incidence of cervical lacerations.

Reporting primiparas *only*, Galloway found an incidence of 15.8 per cent in 500 cases; Aldridge and Watson 34 to 46 per cent in 2,800 patients; Barrett, about 50 per cent unsatisfactory cervical results; King, 78 per cent in 183 patients;

*Read at a meeting of the Obstetrical Society of Philadelphia, October 1, 1936.

Peckham, 79 per cent in 2,550 cases; while Tracy's patients showed an incidence of 90 per cent cervical laceration. In this series there was an incidence of 48.7 per cent of cervical laceration demonstrable six weeks postpartum.

For the purpose of classification we have divided the cervical results into five groups:

Grade A, No demonstrable cervical injury.

Grade B, Superficial laceration healed spontaneously 6 weeks postpartum, or erosion, or both.

Grade C, Unilateral lacerations sufficient to produce definite cervical deformity, estimated depth ½ cm. or greater.

Grade D, Bilateral lacerations of estimated depth of ½ cm. or greater.

Grade E, Stellate lacerations of ½ cm. or greater.

TABLE I. INCIDENCE OF CERVICAL INJURY

CHARACTER	GRADE	NO. CASES	PERCENTAGE		
Normal	A	72	37		
Erosion	B-35				
Superficial	B-48	75	39	Satisfactory	76%
Unilateral	C	24	12		
Bilateral	D	19	10		
Stellate	E	3	2	Unsatisfactory	24%
Totals		193	100		

As a further criterion of the severity of this classification, let it be said that only six of the lacerations were of sufficient depth to cause a definite eversion of the cervical lips.

In no case was pituitrin used until the completion of the third stage of labor. In no case was a manual or instrumental dilatation of the cervix done.

For purposes of simplification in our further studies those cervices Graded A and B were considered satisfactory, since Grade B is the type of injury which readily responds to office cautery. Grades C, D, and E are listed as unsatisfactory cervical results.

MALPOSITION

It is our custom to divide retrodisplacements into three different classes:

First Degree Retroversion.—A backward rotation of the uterus on an imaginary axis passing transversely through the cervico-fundal junction so that the fundus points toward the promontory of the sacrum.

Second Degree Retroversion.—A backward rotation in which the fundus points toward the hollow of the sacrum.

Third Degree Retroversion.—In which the fundus points toward the culdesac. In second and third degree retroversion there is commonly associated a retroflexion, or bending backward of the fundus on the axis of the cervix. In this study all patients with second or third degree retroversion showed a concomitant retroflexion and in this classification no separate distinction will be made.

The reported incidence of malposition in primiparous women also shows wide variation. Reporting only second or third degree retroversions, Aldridge found 16 to 25 per cent; Peckham, 18 per cent; W. M. Findley, 26 per cent; Polak, 28 per cent; and Plass and Fullerton, 30 per cent. In our series there was an incidence of 28.5 per cent, six weeks postpartum.

With these facts in mind the chiefs of staff of the Philadelphia Lying-In Hospital laid down the following regulations for the postpartum care of all patients:

1. All patients were encouraged to lie on the abdomen for several hours daily during their hospital stay.

2. All patients were subjected to pelvic examination at the time of discharge from the hospital and malposed uteri replaced manually at that time.

3. All patients were advised to assume the knee-chest position (after instruction by a nurse) for ten minutes twice daily, to lie on the abdomen for one-half hour afterward, and to sleep in the prone position when at home. These were all ward patients in many of whom economic and social conditions made an immediate return to work imperative. Lynch's study of 1,230 cases showed that 44 per cent of ward cases showed a retroversion as opposed to 19.6 per cent of private patients and attributed this vast difference to economic conditions.

TABLE II. INCIDENCE OF MALPOSITION

CHARACTER	GRADE	NO. CASES	PERCENTAGE
None	0	103	53.4
First degree	1	24	12.4
Retrocessed	Retro	11	5.7
Satisfactory			71.5
Second degree	2	38	19.7
Third degree	3	17	8.8
Unsatisfactory			28.5
Totals		193	100.0

Because they were not considered as pathologic entities traceable to labor, first degree retroversions and retrocessions have been classified as satisfactory results; second and third degree retroversions are unsatisfactory.

TABLE III. INCIDENCE OF ADNEXAL DISEASE

TYPE	CASES	PERCENTAGE
Inflammatory	2 (G. C.)	1.0
Neoplastic	1 (Ov. cyst)	1.5
Postural	10	5.0

These statistics are presented only for their negative value. With the possible exception of the prolapsed ovaries no injuries to the adnexa could be attributed to the effects of childbirth.

TABLE IV. RELATION OF TYPE OF FORCEPS DELIVERY TO CERVICAL INJURY AND MALPOSITION

	COMPLICATED	LOW
Satisfactory cervix	69.7%	77.7%
Satisfactory posture	63.6%	66.7%

The patients delivered by low forceps showed the highest percentage of satisfactory results for two reasons: They had easier parturitions and less cervical trauma in delivery.

The postural results bear out the opinion of Plass and Lynch that forceps delivery is apparently unrelated to the incidence of malposition.

RELATION OF AGE TO CERVICAL INJURY AND MALPOSITION

In the patients studied the best results were obtained in the twenty-five to twenty-nine-year old group. The good result is attributable to the fact that these

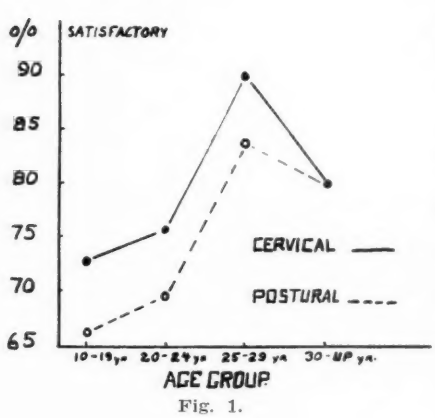

Fig. 1.

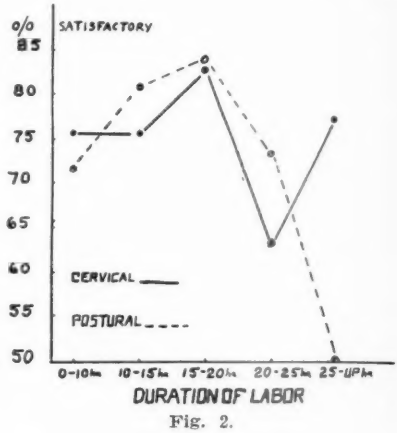

Fig. 2.

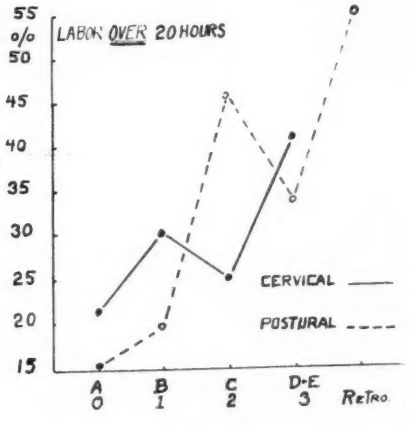

Fig. 3.

patients were old enough to be mature but young enough to retain the elasticity of their tissues.

RELATION OF THE DURATION OF LABOR TO CERVICAL INJURY AND MALPOSITION

The similarity of the two curves indicates that the duration of labor bears a definite relationship to the extent of damage incurred. In this group the ideal duration of labor was fifteen to twenty hours.

Short, violent labors produce cervical injury because sufficient time is not allowed for uniform dilatation, and the cervix is, therefore, more subject to laceration. In general, long labors show a higher incidence of laceration because of cervical dystocia, congenital and acquired, disproportion with large babies, and the higher incidence of complex operative procedures to terminate the prolonged labor. The apparent inconsistency of cervical results after twenty-five hours of labor is due to the retrocessed uteri in which we found 91 per cent satisfactory cervical results despite 55 per cent of labors above twenty hours.

Short, violent labors also damage the fundus. It is inconceivable to me that a uterus, capable of expelling a full-term fetus in less than ten hours, does not have good musculature before delivery. Therefore, the incidence of malposition after these labors must be due to actual damage incurred during labor. The malposition following long labor may be due to poor uterine musculature present before delivery or to damage incurred to a true dystocia due to any of the common causes. Fig. 3 will throw additional light on this problem.

RELATION OF CERVICAL INJURY AND MALPOSITION TO THE DURATION OF LABOR

It has been shown that in these patients the ideal duration of labor was fifteen to twenty hours. For this reason we have based this chart on the percentage of labors over twenty hours' duration.

In general, it would appear that the severity of the damage incurred varies directly as the percentage of labor above twenty hours.

Grade C presents an apparent inconsistency. This type of lesion most commonly follows short, violent labors so that 50 per cent of patients with Grade C lacerations have a duration of labor of less than ten hours. This accounts for the depression of the curve at this point.

Second and third degree retroversion also show an apparent inconsistency. The statistics represent the record of two widely different types of labor. In those patients with second degree retroversion 32 per cent had less than ten hours' labor and 35 per cent showed over thirty hours of labor. In those patients with third degree retroversion 44 per cent showed a labor less than ten hours and 28 per cent over thirty hours' duration. These percentages should present a fairly good index of the percentage of malposition due to too rapid labor as compared to the per centage associated with prolonged labor. As an index that both deficient uterine musculature and true dystocia play a part in the incidence of prolonged labor the study of retrocession has been listed separately. It is seen that the known deficient musculature was responsible for by far the highest percentage of prolonged labor.

TABLE V. RELATION OF CERVICAL INJURY AND MALPOSITION TO MORBIDITY

Cervix	Grade A	14.0%
	All others	29.0%
Posture	0	23.0%
	1	12.5%
	Retro	18.0%
	2	16.0%
	3	29.0%

In general, it appears that the percentage of morbidity is proportional to the degree of injury sustained. The high percentage of morbidity among patients with normally posed uteri is striking. Analysis of the cases of morbidity in this group shows one-third due to pyelitis (following a grip epidemic), one-third due to breast engorgement, and inflamed perineum following repair, and one-third due to sapremia and endometritis.

TABLE VI. RELATION OF MALPOSITION TO SUBINVOLUTION

	MALPOSED	NORMAL
No cases	90	103
Subinvoluted	17	4
Percentage	20%	4%

Subinvolution was 5 times as great among the malposed as among the normally posed uteri.

TABLE VII. RELATION OF MALPOSITION AND SUBINVOLUTION TO SAPREMIA AND ENDOMETRITIS

TYPE	CASES MORBID	SAPREMIA AND ENDOMETRITIS	PERCENTAGE
Normal	25	13	52.0
Malposed	18	12	66.6
Subinvoluted	5	5	100.0
Totals	48	30	62.5

Sapremia and endometritis were roughly one and one-half times as frequent in the patients with malposition and two times as frequent in the patients with subinvolution.

SUMMARY

1. The lesions of the internal genitalia found at follow-up examination six weeks postpartum in 193 ward primiparas delivered by forceps at term are tabulated.

2. An incidence of 48.7 per cent of cervical lacerations, and 28.5 per cent of second and third degree retroversions is reported.

3. In the patients studied the group whose labor was between fifteen and twenty hours' duration showed the best results.

4. In the patients studied the group whose age ranged between twenty-five and twenty-nine showed the best results.

5. It is shown that patients delivered by low forceps operation show a higher percentage of satisfactory cervical results than those in which complicated forceps deliveries were done. It is suggested that the type of forceps delivery has little if anything to do with the incidence of malposition.

6. It is shown that poor anatomic results occur in patients with too rapid a labor as well as in those with prolonged labor.

7. It is shown that prolonged labor with its attendant malpositions may be due to a normal uterus, working against abnormal resistance to delivery or to a deficient uterus working against a normal resistance.

8. It is shown that there is a definite relation between poor anatomical results and the percentage of morbidity.

9. It is shown that subinvolution was five times as great among the patients with malposed uteri as opposed to those with normally posed uteri.

10. It is shown that sapremia and endometritis are one and one-half times as frequent in patients with malposed uteri and two times as frequent in patients with subinvoluted uteri as in those who show neither of these conditions.

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DISCUSSION

DR. BEHNEY.—Many of us have sensed the relationship between lacerations, retroversions, subinvolutions of the uterus and benign uterine hemorrhage. Nugent's study justifies such opinions and will attract attention to an important feature of obstetrics and postpartum care.

DR. COLLIN FOULKROD.—I doubt very much whether we shall know much of this subject until someone is astute enough to have records of the uteri before the women become pregnant, to be compared with records of the uteri after labor. We do not know how many women have anteflexed uteri before delivery, so it is very difficult to say if retroversion is a pathologic condition in any way related to labor. I do not believe you can blame forceps delivery for retroversion, except that it may cause some trauma below.

On a first postnatal visit, we may find a uterus in good position, but six months later find it well back. I have seen uteri thrown back by a patient keeping a full

bladder and then lifting a baby. A great factor in helping those patients keep the uterus in position is the advice to keep the bladder empty when working. The condition of the uterine wall depends upon the physique of the woman. Forceps delivery has less part to play in this subject than oversized children, producing extreme dilatation of the supporting ring at the brim of the pelvis. High forceps through an undilated cervix may, of course, produce the same results.

DR. JOHN McGLINN.—If we give the patients time to dilate the cervix, it is a rare thing to see a lacerated and traumatized cervix. If, on the other hand, you cannot wait to have the patient dilate the cervix satisfactorily, then you see the lacerations. If you are patient enough to let the patient have her baby in her own time, lacerations will not often occur.

DR. NUGENT (closing).—An examination two weeks after discharge from the hospital is of material value in detecting and instituting treatment in that large group of patients who leave the hospital with normally placed uteri, only to return with a retroversion at the sixth week following discharge.

Foulkrod's experience that heavy babies are followed by a high incidence of malposition supports Mengert's experimental work. He found that malposition was due in large part to injuries of the lower third of the parametrium and the upper third of the paravaginal tissues, rather than of the round ligaments, as was formerly thought.

SUPRARENAL CORTEX THERAPY IN THE VOMITING OF PREGNANCY

II. THE RESULTS IN SEVENTY-EIGHT CASES

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IN A previous communication[1] we presented the case report of a patient who had pernicious vomiting during pregnancy and who was apparently cured by the administration of suprarenal cortex. The rationale of this treatment, based upon Kemp's hypothesis[2] of the function of the adrenal cortex in the pregnant woman, was elucidated in that paper. Since then, we have prescribed the hormone in 78 consecutive cases of women in whom nausea or vomiting during pregnancy was a conspicuous symptom.

The hormone was dispensed in tablets and ampules, equivalent apiece to 3 gr. of dried adrenal cortex. The tablets were taken orally, while the ampules, containing 1 c.c. of solution, were administered either intramuscularly or intravenously. Hormone therapy was resorted to only after the ordinarily accepted remedies, such as alkalies, fruit juices, hypodermoclyses, and the like, failed to give relief. It must be emphasized that only the Armour product was used.

The tablets were given to those who were merely nauseated or who vomited but rarely or at regular intervals. With these patients we were reasonably sure that the tablets would not be vomited. All members of this group were ambulatory and were self-administrators of the drug. They were told to take one tablet three times daily, about one-half hour before their regular meal. If at the end of a week their symptoms had not completely ceased, the dose was increased up to six tablets a day. The use of the tablets was continued until the entire contents of a bottle of 100 were taken. In only one instance was it found necessary to prescribe more than one bottle for any patient.

The hypodermic route was prescribed for those patients who vomited at irregular intervals or who vomited everything taken by mouth. The contents of one ampule (1 c.c.) were injected three times a day, about one-half hour before the regular mealtime. The injections were continued thus for three days *after* the disappearance of all signs of vomiting; then one ampule was replaced by one tablet on each successive day, so that by the end of the sixth day after cessation of vomiting, the patient was receiving three tablets a day and no ampules. The use of the tablets was then continued until 100 had been taken. Ambulatory patients were given the injections by the district nurse, relatives, or friends, or even took them themselves.

RESULTS

For clarity of description we have divided the group of 78 patients into subgroups bearing reference to the severity of the symptoms. The results are summarized in the accompanying table.

TABLE I

TYPE OF CASE	NO. OF CASES	AGE RANGE	PARA RANGE	TRIMESTER	WEAKNESS	KETOSIS	CORTEX Rx	EFFECT
I Nausea alone, no vomiting	6	23 to 36	i to ii	First	Moderate	0	Tablets only	5 cured (1-2 weeks) 1 failure
II Moderate to severe nausea and slight to moderate vomiting	41	20 to 38	i to v	First	Marked	None 39 Slight 2	40—Tablets alone 1—Ampules	40 cured 1 failure Ampule cured
III Severe nausea and severe vomiting	15	21 to 34	i to iv	First and second	Marked	Slight	Ampules replaced by tablets	All cured in 1 to 5 days
IV Pernicious vomiting	16	25 to 36	i to iv	First and second	Marked	Marked	Ampules replaced by tablets	15 cured (3-5 days) 1 only after vitamin therapy

Group I: Nausea but no vomiting.—Only 6, or 7.7 per cent, of the patients belonged in this group. Four of them were experiencing their first pregnancy, and all were in the first trimester of their present one. Their ages ranged from twenty-three to thirty-six years and their weights from 100 to 198 pounds. In addition to being nauseated they felt slightly weakened; not one, however, showed any signs of ketosis. They were given the tablets only.

Five of the group were entirely relieved of nausea in from one to two weeks; of these, 3 were relieved within the first week. The sixth patient reported that no relief was obtained, but she eventually ceased to be bothered by the nausea when her second trimester was reached.

Group II: Moderate to Severe Nausea and Slight to Moderate Vomiting.—Forty-one, or 53 per cent, of the treated patients were included in this group. Their ages ranged from twenty to thirty-eight years, and their weights between 113 and 204 pounds. All were in the first trimester of their present pregnancy, and the majority of them had had one or more previous pregnancies. All had a marked weakness in addition to nausea and vomiting. Thirty-nine had no ketosis; the remaining two had only slight acetonuria. Forty patients were given the tablets alone, and one patient had an initial course of intramuscular injections. The entire group was treated at home.

Of the 40 patients who were treated with the tablets only, 39 were entirely relieved within one to two weeks, while the remaining patient obtained no relief whatsoever. She was lost trace of soon after and no further medication or study was possible. The only member of the group who received the hormone intramuscularly was entirely relieved of all symptoms by the end of the second day.

Group III: Severe Nausea and Severe Vomiting.—This group numbered 15, or 19 per cent of the patients studied. Their ages ranged from twenty-one to thirty-four years and their weights from 124 to 173 pounds. Only one patient was a primipara. All but 2 patients were in the first trimester of their present pregnancy, while the remaining 2 were in their second trimester. All of them felt a marked weakness in addition to the nausea and vomiting. Their urine contained only traces of acetone; there was no diacetic acid. Even though all the patients were treated at home, they were given the hormone initially via the hypodermic route.

All the members of the group were completely relieved of their symptoms within three to five days following the beginning of the therapy, while most of them felt markedly relieved within the first twenty-four hours.

Group IV: Pernicious Vomiting.—Belonging to this group were all the patients who vomited everything taken by mouth and whose urine contained large amounts of ketone bodies. Sixteen, or 22 per cent of the entire number, belonged to this group in which is included the patient whose case we had reported previously.[1] The majority were in their first trimester of their present pregnancy and were multiparas, while the remainder were in the second trimester and were primiparas. Their ages ranged from twenty-five to thirty-six years and their weights from 133 to 190 pounds. They had previously been treated at home with about every known medicine used for this condition, but without obtaining the slightest relief. All of them had to be sent to the hospital where they were given glucose-saline solution intravenously immediately. The hormone was administered later by the same route.

Fifteen of the group became symptom-free by the fifth day following the beginning of the treatment and the majority of them by the third day. Every one of them reported that they felt much improved within the first thirty-six hours. The remaining patient of this group presented such unusual and interesting features as to warrant a more detailed story.

CASE REPORT

Mrs. M. was thirty-three years of age and was in her second pregnancy; she had been delivered of twins at her first pregnancy, when she was twenty-six years of age. The twins had been delivered without too much difficulty and their subsequent development had been uneventful. While she was in the first trimester of her present pregnancy, she had vomited considerably at irregular intervals and had been given the usual alkalies and fruit juices, as well as thyroid tablets for she was slightly obese. Soon after, because her vomiting had become more severe and because traces of acetone were found in her urine, she was sent to the hospital and was given glucose-saline and suprarenal cortex intravenously. Her symptoms ceased before the third day. On the third day she felt so markedly improved that she asked to be allowed to go home. Contrary to our better judgment she went home, but the necessity of faithfully taking the suprarenal cortex tablets was impressed upon her. Two weeks later she returned in a condition similar to that of her former admission. Again her symptoms cleared readily with the intravenous hormone therapy, and again she pleaded to go home on the third day. This time her husband joined in on the request. She went home against advice but, as before, instructions were given her concerning her treatment.

About a month later she reported once more in a state of dehydration and ketosis, but this time it was much more severe. At home, she had tried all kinds of remedies, of her own accord, upon the advice of relatives, friends, and neighbors. Her symptoms had not only persisted but had actually become worse; she was so weak that she could not walk even with assistance. She had hesitated to report to her physician because she hoped that the vomiting would stop when she entered her second trimester, and because of the hospital expense.

At the hospital her urine was found to contain large amounts of both acetone and diacetic acid. Moreover, her mind began to wander. It was apparently difficult for her to concentrate, for she answered questions slowly, in a hesitating manner. She was often irrelevant and her memory for remote and recent events was impaired even as to her own age and the ages of her husband and children. Within three days after entry into the hospital, she began to tolerate food in her stomach, but her strength and memory were failing; she could not recognize her husband and children part of the time. Her urine had lost all traces of diacetic acid, but because it was not acetone-free, and despite the fact that her blood sugar was only 83 mg., she was given five units of insulin three times a day, together with the glucose saline and hormone. Her urine became acetone-free within twenty-four hours and she ceased vomiting entirely. Her strength and mental condition, however, appeared to be worse than ever. She also complained, at this time, of pains in both lower legs. A few nights later, the nurse found her lying on the floor near the bed. At the time, she related to the nurse that she attempted to go to the bathroom but that her legs would not support her when she stood up. The following morning, in answer to direct questioning, she could not remember falling to the floor and neither could she remember attempting to get out of bed. A complete neurologic examination revealed that she had a peripheral polyneuritis. Large doses of vitamin concentrates were added to her diet. Within a few days the pains in her legs completely disappeared and her strength gradually returned. By the end of the week, she had regained so much of her strength as to be able to walk without assistance; her mental condition, too, was better. She was then allowed home in the care of her mother. At home, with the same vigorous dietary regime, she recovered completely except for a slight, left leg-lag which was noticeable only on careful scrutiny. At the end of her full-term pregnancy, more than four months ago, she was delivered without much difficulty of a normal and healthy baby.

DISCUSSION

Kemp's hypothesis was formulated through the postmortem study of the adrenals of only a few women who died of trauma during the pregnant state. It is evident, therefore, that our therapeutic study must be considered as purely empirical, and that many more patients must be studied and a suitable number set up as controls before a fair evaluation can be made. This is a problem for future work. Our present discussion will be adjusted to the requirements of an adequate but conservative estimate of the results obtained.

It is evident that the age, weight, and multiparity of the patient bear no relation to the severity of nausea, vomiting, and weakness. It is likewise evident that the age, weight, and multiparity of the patient bear no relation to the effect obtained by the suprarenal cortex medication.

The psychic factor, which is so notably present in pregnant women, is difficult to evaluate at present. It must be remembered, however, that in all instances the suprarenal cortex was not used until after the patient failed to get any relief from the medicaments ordinarily used. To the patients, then, the suprarenal cortex was just another drug and, as such, could not have been a more potent psychic stimulus than the other drugs. To those patients who received the medication hypodermically, it may be supposed that the needle injections alone may have been of sufficient psychic stimulation to cause their vomiting to stop. All of the patients were given glucose-saline parenterally quite a few hours before the hormone was given, and in our first case the patient had been given glucose-saline intravenously for several days before the suprarenal cortex administration was started. In no instance did the nausea or vomiting lessen because of the use of the needle before the adrenal cortex injections. It is evident, therefore, that no matter how important the psychic element may have been, it was not the all-important factor.

Muscular weakness was an accompanying symptom of nausea and vomiting in almost every patient, the severity of weakness being in direct proportion to the severity of the nausea and vomiting. The single exception was that of a patient who developed a rather typical syndrome of peripheral polyneuritis.

Because in the first group there were but six cases, which is too small a number for analysis, and because the symptoms of the patients of the second group were similar in character to the symptoms of the patients in the first group, only a bit more severe, the two groups may be discussed as one. That they are similar in character is evident by the presence of nausea, weakness, and the lack of a definite ketosis. The dissimilarity is in the degree of vomiting, which in no instance was severe.

With the combination of Groups I and II, there were 47 treated patients of whom 2, or 4.3 per cent, were definite failures. Only one patient was given an initial course of the medication via the hypodermic route, and she was readily cured. It is to be noted that the patients successfully treated with the tablets alone, 44 in number, required from one to two weeks' medication before the symptoms had entirely disappeared, although many of them felt much relieved before this time.

In Group III, 15 cases constituted the series. The medication was given hypodermically in every instance, and a cure was effected in every case within from three to five days. The patients in Group III were much sicker than the patients in Groups I and II, yet they were cured in about one-third the time. We should expect that any drug taken orally by pregnant women would reveal its effects more slowly and with more of an uncertainty than if given parenterally. The self-administration of any drug by the patient is a method always full of uncertainties and uncontrollable factors. It is dependent upon the faithfulness of the patient, the motility and the absorptive action of the gastrointestinal tract. Pregnant women are noteworthy for their sluggish gastrointestinal tracts. It is reasonable to conclude, therefore, that if the discomfort and severity of nausea and vomiting are serious enough to warrant treatment, the medication should be given in a manner to yield the quickest and most reliable results.

In the fourth group (IV), that of pernicious vomiting, there were 16 patients treated. It must be reemphasized that, in every instance, these patients had been treated with almost every kind of remedy at home before they were put on suprarenal cortex medication. No material benefit was observed by the preliminary liter of glucose-saline injected intravenously upon their admission to the hospital. It is true that not much time was allowed to elapse, only a few hours, between the initial glucose-saline and the first dose of adrenal cortex solution, except in the first case when the patient had received injections of glucose-saline for days before the hormone therapy was started. After the first case, we did not feel it safe or fair to the patient to allow too much delay for experimentation.

It was the study of Mrs. M.'s case, whose report is quoted in detail, that taught us the value of vitamin concentrates in the patients' diets. Thereafter, all subsequent patients were given high vitamin, fat-free diets to begin with, as soon as they could tolerate food. Gradually a regular diet, rich in vitamins, was given as the progress of the patient warranted. Too much stress cannot be laid upon the necessity of rapid vitamin replacement in the body. It must be remembered that protracted vomiting not only leads to dehydration and ketosis but also to avitaminosis, and all three conditions are serious and must be treated with equal vigor. Avitaminosis may not only lead to serious complications but, if prolonged, it may even lead to death itself.

It is unlikely that in the few instances that insulin was given, it acted any more than as an adjunct to the quicker recovery of the patient. Insulin was administered only to those patients whose ketosis did not clear as rapidly as vomiting and was never given early in the course of treatment. It was most peculiar, though, that of every patient who received insulin, their blood sugars were all in the low eighties before the first insulin injections. A satisfactory explanation for this phenomenon has not yet been advanced.

It is probable that in a study of an adequately controlled and larger group, the number of failures with the suprarenal cortex therapy will be increased and more nearly approach the proportion of failures with other therapeutic regimes. This, however, can be stated: even if a larger percentage of failures may occur, for the present suprarenal cortex therapy not only is the easiest regime so far advanced but, also, it actually reduces the expenses of hospitalization for the patient, and reduces the expenses of the hospital itself. There are no long, tedious and expensive tasks to this therapy.

Up to the present, no contraindications have been encountered with the use of this drug in pregnant women who are suffering with nausea and vomiting.

It is a well-known fact that different endocrine manufacturers use different methods for extracting some of the endocrine glands. It is also well known that variations in the methods of extraction may not only vary the potency of the resulting hormone, but may even yield an entirely different hormone (or hormones) having absolutely different effects in the human body. In our first case we used Armour's preparation at Kemp's suggestion, and since we wanted to study the efficacy of the drug, it was necessary to use a product similarly extracted. For these reasons we used the Armour product exclusively. We have no idea what effects, if any, would be obtained by using adrenal cortex extracts manufactured by others. It is with these considerations in mind, and not because of any other interest, that we emphasize the use of the Armour preparation in order to get comparable results.

SUMMARY

Seventy-eight pregnant women were treated for nausea and vomiting with Armour's suprarenal cortex after the failure of the ordinarily used remedies for this condition. The less severe cases of nausea and vomiting were treated exclusively with tablets; the more severe cases were treated at first with parenteral injections of the hormone.

Of the 47 treated patients with less severe nausea and vomiting, only two, or 4.3 per cent, failed to receive any benefit from the hormone.

There were 15 patients who had severe nausea and vomiting and 16 patients who were classed as having pernicious vomiting. A cure was effected in every instance within from three to five days with the parenteral treatment. It is important to note that in no instance did the condition of nausea and vomiting become more severe, necessitating the interruption of pregnancy.

In the more severe cases of nausea and vomiting, the body fluids and vitamins were replaced as rapidly as possible. In those patients in whom the ketosis did not clear as rapidly as their clinical symptoms, insulin was added to their intravenous medication.

The lack of an adequately controlled study has been discussed.

No contraindications of the use of suprarenal cortex have been encountered.

CONCLUSIONS

Suprarenal cortex is an efficacious and important therapeutic weapon in combating the various types of vomiting due to pregnancy. As used by us, it is a more reliable and less costly therapeutic regime than any tried heretofore. Our results warrant its use as well as further study in combating the condition.

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THE DIAGNOSTIC VALUE OF THE X-RAY IN PLACENTA PREVIA*

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OUR interest in the x-ray diagnosis of placenta previa was aroused by a paper of Ude and Urner,[1] who reported a series of thirty-five cases with bleeding in the last trimester of pregnancy, of which fourteen were placenta previa, diagnosed by x-ray. Their technic included the instillation of 40 c.c. of 12 per cent sodium iodide in the bladder, followed by a direct anteroposterior x-ray of the abdomen. Diagnosis of placenta previa was made on finding a space between the presenting part and bladder of more than 1 cm.

Our interest was further aroused by an article by Hundley, Walton, Hibbitts, Siegel and Brock[2] in which ten of twenty-seven normal cases

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studied, showed a space of from 1 to 2.5 cm. between the fetal head and bladder. However, in this series the technic used was quite different. Intravenous injections of skiodan (20 c.c.) were given, after which the x-ray films were made.

We have followed a series of cases at Saint Mary's Hospital and have found that x-ray studies in cases of uterine hemorrhage occurring in the last trimester of pregnancy assume a great importance both as adjuncts to clinical diagnosis and as guides to choice of treatment. Proper interpretation of information afforded by these studies should lessen greatly the existing chance of instituting improper treatment and also do much to eliminate trial-and-error methods.

A digital examination, although of final importance in the differentiation of uterine bleeding, incurs the possibility of immediate delivery when such procedure might be disadvantageous to mother and child alike. It also incurs the danger of contamination of the birth canal with subsequent infection, which danger is second only to that of renewal of hemorrhage. At this point, x-ray films have proved extremely valuable in locating the placenta. We used the technic described by Ude and Urner. A number of such cases were followed with confirmation of x-ray and clinical diagnosis in all cases, except one of ablatio placentae, in which the film showed the same variation in relation of fetal head to bladder as found in placenta previa centralis. In this case, however, the clinical diagnosis of ablatio placentae had been made and the change in relation between fetal head and maternal bladder was ascribed to a bulge of fore-water caused by the markedly tense uterus or by concealed hemorrhage and blood clot. An appreciable space existed between presenting part and bladder, but there was no bladder deformity resembling that which was seen in the placenta previa cases.

Of 40 cases of bleeding, 18 were cases without placenta previa. Seven were placenta previa, five were breech presentations, and the remainder were normal controls of seven, eight, and nine months' gestation.

The points considered in estimating the position of the placenta in our series were as follows:

1. During the last trimester, the presenting part lies in close apposition with the bladder, being separated by only a few millimeters of lower segment, scalp, and bladder wall. (Throughout this discussion we are concerned principally with cephalic presentations, as in breech presentation x-ray is of only speculative value and in transverse presentation of no value at all.)

2. The intervention of a soft tissue mass, such as placenta, produces an alteration in this relation in the form of an appreciable space, which we believe must approach 1.5 to 2 cm. to be of importance.

3. The apposition causes a concavity to appear in the superior wall of the bladder which corresponds to the convexity of the presenting part and which lies in the plane of transmitted pressure.

Therefore, from this it is possible to determine not only the presence of placenta but also to estimate its position as shown by the plane of bladder deformity.

The following cases illustrate the above points:

CASE 1.—Thirty-six-year-old white primipara admitted during eighth month of pregnancy, with history of painless bleeding. Patient said she had an uneventful

Fig. 1.—Case 1. Central placenta previa showing space between fetal head and maternal bladder with bulk of placenta lying at left of midline. Diagnosis confirmed at cesarean section.

Fig. 2.—Case 2. Partial placenta previa with head displaced to right and bladder to left. Placenta found on left side at time of version and extraction.

pregnancy up to twelve hours before admission, when she bled about 300 c.c. without apparent cause. X-ray revealed central placenta previa with widest part of placenta just to the left of midline of pelvis. Patient carried to term with conservative treatment, when she bled slightly and cesarean section was done with good result. Central placenta previa as diagnosed by x-ray was found.

The position of the placenta, as estimated by the plane in which pressure was apparently transmitted to the bladder wall, was confirmed at operation.

CASE 2.—Forty-four-year-old white gravida xiv, para vi, admitted during the eighth month of pregnancy, with history of intermittent bleeding of small amounts during past two months. During the two days before admission, she had slight cramplike abdominal pain at irregular intervals. On morning of admission, however, patient was awakened by profuse painless vaginal bleeding. The clinical diagnosis made was that of placenta previa. X-ray showed the bladder to be displaced to the left with the maximum of soft tissue space just to the right of the midline. X-ray diagnosis was partial placenta previa with the bulk of placenta lying to the right of the os. This was confirmed at the time of rupture of membranes and version. The x-ray diagnosis of partial placenta previa thus gave us from the beginning a clearer idea as to the pathology present and made the choice of vaginal delivery much easier.

CASE 3.—Twenty-seven-year-old colored gravida iv, para 0, admitted in the seventh month of pregnancy, with history of having awakened four hours prior to

Fig. 3.—Case 3. Ablatio placentae showing appreciable space between fetal head and maternal bladder but lacking characteristic flattened appearance of bladder seen in placenta previa cases.

admission with severe cramplike pain in the lower abdomen, which was followed by a steady moderate flow of blood from the vagina. Pain and bleeding continued throughout time of observation. Uterus was tense and felt larger than a seven months' pregnancy. A clinical diagnosis of ablatio placentae was made. On x-ray examination, there was found an appreciable space between the presenting part and the bladder. The form of the cystogram in this case showed only a very slight departure from that of the normal cystogram seen in nonpregnant subjects. It was directly comparable to that seen in early pregnancy and also in a case of transverse presentation, in which case insufficient pressure was exerted on the bladder to cause any notable deformity. Patient was prepared for delivery and for transfusion and a vaginal examination was done. The membranes were ruptured, a Voorhees' bag No. 4 inserted and the patient allowed to deliver normally. No placenta was felt near the os. The placenta, after delivery, showed a large darkened central area compatible with ablatio placentae. This case brings out the

point that an appreciable space between the presenting part and bladder does not always mean placenta previa. An alteration in the form of the cystogram suggesting transmitted pressure must be watched for, and the clinical findings should be used in conjunction with those of the x-ray for a correct diagnosis in such cases.

CASE 4.—Thirty-five-year-old colored gravida ii, para 0, admitted in the eighth month of pregnancy from our clinic because of inability to hear the fetal heart.

Fig. 4.—Case 4. Central placenta previa diagnosed by x-ray and confirmed at delivery.

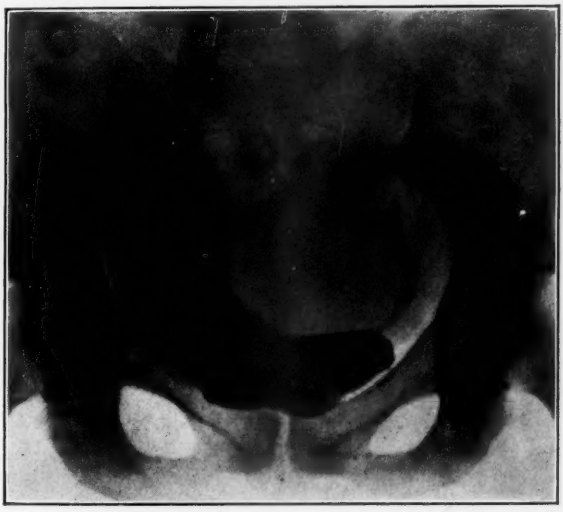

Fig. 5.—Case 5. A bleeding case with no space between fetal head and maternal bladder. This resembles the cystograms of normal cases in the last trimester of pregnancy. At time of delivery no evidence of placenta previa was found. This confirmed the x-ray diagnosis.

Previous pregnancy terminated in a stillbirth at term. No history of bleeding or any other abnormality during present pregnancy. An x-ray study made to determine presence or absence of postmortem fetal changes showed presence of a central placenta previa. No fetal heart was obtained up to time of delivery, when x-ray diagnosis of central placenta previa was confirmed.

The value of x-ray in breech presentations is doubtful. However, we were fortunate in securing films of such presentations, both normal, at seven, eight, and nine months and also of a breech presentation complicated by placenta previa in the eighth month. The three normal cases showed the breech in close apposition with the bladder, while that of the placenta previa, although the film was considered unsatisfactory, did reveal a large space between the presenting part and bladder.

CASE 5.—In our series only one patient with low implantation of the placenta was x-rayed. This was a thirty-seven-year-old white gravida iii, para i, who was admitted during the seventh month of pregnancy. Her history was that of painless bleeding without cause. The films showed the presenting part in apposition with the bladder. She was treated expectantly and delivered during the eighth month, at which time a diagnosis of low implantation was established. Eighteen cases with painless, causeless bleeding during the last trimester, which were x-rayed, showed no appreciable space between the head and bladder wall. These patients subsequently delivered normally. The clinical diagnosis in these cases was not definite, and placenta previa could not be ruled out without x-ray, or a vaginal examination with possible contamination of the birth canal and hemorrhage.

From the above observations we conclude that x-ray in cases with bleeding in the last trimester of pregnancy is of value as an adjunct to the clinical diagnosis and as an aid in locating the placenta in central or partial placenta previa.

We believe that a diagnosis of placenta previa, central or partial, can be definitely ruled out in bleeding cases in the last trimester of pregnancy, which, when x-rayed, show no appreciable space between the presenting part and the bladder.

A bleeding case in the last trimester, which when x-rayed, shows a definite space between the head and bladder, may be placenta previa. If this space is accompanied by a marked bladder deformity, placenta previa is very probably present. Only a most careful digital examination should be made in an attempt at confirmation, and this only when all preparations for delivery, in the manner suggested by x-ray and clinical findings, have been made.

A choice of procedure, if clinical diagnosis confirms x-ray findings, can be more scientifically determined because of the aid in locating the placenta afforded by x-ray.

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34 PROSPECT PARK, W.
220 MAIN STREET

DISCUSSION

DR. FRANK P. LIGHT.—On Dr. Beck's service at Long Island and on Dr. Duncan's service at the Kings County Hospital we have been taking these pictures over a period of three years. During that time we have had a series of 60 such

pictures, of which 12 were of cases with placenta previa. In most of our cases the x-ray diagnosis was confirmed by the subsequent clinical findings, but in a few cases we found the plates misleading. Our final opinion must therefore be reserved until we can study a larger series of cases.

DR. CAMERON DUNCAN.—If you intend to perform a Braxton Hicks or even a typical version, the cystogram gives you a pretty good idea as to which side the placenta is chiefly located. You can use the side where the cystogram is the fullest, with more safety than the side of placenta. That information we found to be of considerable help.

DR. HALL (closing).—I feel that the x-ray is of special value in the eighth month of pregnancy where there has been a fairly brisk hemorrhage, and you are not sure whether you have a viable baby. The x-ray will save the necessity of a vaginal examination which might entail immediate delivery on account of hemorrhage.

ACUTE EDEMA OF THE CERVIX IN PREGNANCY AND LABOR

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AN EXAMINATION of the literature on edema of the cervix occurring during the pregnant state shows that practically all authors are reporting only one of what we consider to be two distinct conditions with different etiologic factors: in one the edema occurs during pregnancy (I), in the other during labor (II).

In 1872 Gueniot[1, 2, 12] published the first report of acute edema of the cervix occurring during pregnancy. Since that time the literature has been remarkably sterile of reference to this condition. Jolly[3] in 1904 was able to report 10 cases of edema of the cervix complicating pregnancy, including 8 cases previously reported by Geyl[15] and 1 case seen by Meyer. Hunter[9] states that it has been possible to collect reports of 30 cases published in the past fifty years (from 1927), and that of these, 24 occurred during pregnancy. To this group DeLee[1] has added 3 cases, and an additional case is reported in this paper.

We do not consider in the above classification edema of the cervix occurring as the result of prolapse of the pregnant cervix, since the etiology of the condition here is self-explanatory, and also because we do not believe the condition can be considered as one of acute edema.

The interest in Group I cases is largely in the rarity of the condition as evidenced by the scarcity of reported cases (28 inclusive).

Group II cases are of interest both on account of their comparative rarity, although in our opinion occur much more commonly than we could be led to expect, by a study of the literature, and on account of their influence on the course of labor.

I. *Acute Edema of the Cervix Occurring During Pregnancy.*—Acute edema of the cervix has been seen during the second, third, and seventh months, and also at the end of pregnancy, and undoubtedly may occur at any time during gestation. Jolly claims that it has never occurred

in a nonpregnant state. The condition is more or less transient, but may recur at intervals and persists not longer than ten to twelve days. Either the anterior lip or entire cervix may be involved. The etiology is obscure but it is probably angioneurotic.

Mrs. B., aged twenty-nine years, para ii. Patient was first seen at end of second month. Examination at this time revealed no pathology. Past history was negative. Pregnancy progressed normally until early in the seventh month, when by telephone she reported a "swelling in the vagina." When seen there was a purplish mass protruding from the vagina the size of a small orange, from which exuded a moderate serosanguineous discharge. This proved to be an enormously swollen and edematous cervix which pitted on pressure, and could not easily be replaced within the vagina. It was thought at first that the condition was that of a prolapse with the attendant edema due to pregnancy. However, on bed rest, and with wet dressings, the edema completely subsided during the following eight days and it did not recur during the remainder of the pregnancy. Labor was easy and uneventful. No prolapse could be demonstrated postpartum and there was no residual pathology in the cervix other than a mild cervicitis.

II. *Acute Edema of Cervix Occurring During Labor.*—Acute edema of the cervix occurring during labor, while apparently a rare condition if the volume of published cases is a criterion, undoubtedly occurs more frequently than we have been taught to expect. It is possible that the reason for its unusually rare appearance in the literature is due in part to the fact that most "classifications of diseases," such for instance as that of Massachusetts General Hospital, make no mention of the condition as a complication of pregnancy or labor, and consequently these cases as such do not appear in the hospital files. In our own experience we can vouch for the accuracy of this observation, as it has been difficult to collect the twenty cases herein reported, although in consulting individual obstetricians, the condition for the most part is well recognized. We were able to find twenty cases in 12,461 deliveries, an incidence of one in 623. Cathola and Seydel report one in 448 deliveries.

It may be well to state at the outset that in our opinion the etiologic factors concerned in the production of this type of edema of the cervix are not the same as those concerned in edema occurring during pregnancy, namely, the angioneurotic type. In fact, we believe that there may be several factors and combinations of factors concerned in the production of this condition.

The interest to the practicing obstetrician in this group of cases lies mainly in its effect upon the course of labor. Labor progresses to various degrees of dilatation in the first stage depending upon the time that the edema occurs. From then on in spite of pains which are frequently stronger and of longer duration than usual, progress stops and there may be no advance in the course of labor for an indefinite period. If the condition is not recognized and treated, the patient may labor with gradual diminishing pain and with, eventually, signs of exhaustion. The formation of a contraction ring may even occur. At times a dis-

colored cystic appearing cervix may appear at the vulva, and be mistaken for the bag of waters. We have known of instances in which attempts at rupture have been made before the condition was recognized. Either the anterior lip or the entire cervix may be involved in this process; the former, however, is much more common. As the head descends into the pelvis, the anterior lip impinges behind the symphysis pubis and is compressed with each pain, which aggravates the condition already present. We have seen two cases of complete avulsion of the cervix resulting in neglected cases. In one the patient entered the hospital after many hours of labor, bringing with her a mass of cervical tissue, showing marked edema and dilatation of the external os to about 4 cm. In the second case, also long in labor before entrance, a mass of same character was removed from the vagina.

Early diagnosis is important both from the standpoint of the mother and the child, and if unrecognized, progress in labor may be delayed indefinitely. It is probable that in many cases recognition of the condition has not been made because reliance has been placed entirely upon rectal examination, and it is very easy to overlook a moderate edema of the anterior lip, which is most commonly encountered, unless vaginal examination is done.

Treatment will depend upon the condition when first discovered as the cause of dystocia. If the head is well down in the pelvis and the cervix well dilated, simply lifting the anterior lip over the impinging occiput and allowing labor to progress normally is all that is necessary. If delivery has been delayed until the patient is exhausted and uterine contractions no longer adequate, it may be necessary to terminate labor by operative means. If edema has occurred before there has been sufficient dilatation to allow passage of the fetal head, it may be necessary to do Duhrssen's incision and terminate labor operatively. We have not yet encountered a case occurring so early in the course of labor as to make the use of Duhrssen's incision dangerous; that is, cervical dilatation had progressed to 4 cm. or more. Should a case be encountered in which cervical dilatation and retraction of bladder, ureters, and pelvic vessels was not sufficient to make this procedure safe, we believe that vaginal hysterotomy followed by operative delivery from below would be the procedure of choice; particularly if the pelvis was normal.

Calhoun[5] states that all cases observed by him were multiparous patients and therefore considered the edema due to previous trauma to the cervix. We do not agree that multiparity is the only etiologic factor, as among twenty cases fifteen of ours were primiparas.

TABLE I. PARITY AND AGE

Para i	15	Average age 29.3 years
Para ii	2	Average age 35.8 years
Para iii	1	
Para iv	1	
Para vi	1	

Age incidence is probably of some importance as an etiologic factor in primipara. Acute edema of the cervix apparently occurs rarely in young primiparas. The average age of the primiparas[15] concerned in this group was 29.3 years (Table I). If the commonly held idea that elderly primiparas frequently have fibrous cervices is correct, then we may have in these cases at times an "obstruction to the outflow of fluids" with the production of edema during labor. The same can be said for the edema occurring in multiparas; the trauma of previous labors, resulting in scar tissue formation, plus pressure of the presenting part against the cervix may at times result in edema.

In considering the effect of a contracted pelvis on labor, Irving[6] says, "the anterior lip of a partially dilated cervix may be incarcerated between a tightly impacted fetal head, and posterior surface of the symphysis. In such an instance the anterior lip becomes edematous and further progress ceases. This condition is particularly likely to complicate a flat or rachitic pelvis." Cathola and Seydel[7] also mention the frequency of its occurrence during the course of labor in cases with moderately contracted pelves. The finding of edema of the cervix during labor in two of our cases, one with a flat pelvis, and one with a moderately generally contracted pelvis, both in primiparas, would seem to confirm the above observations.

The rôle of posterior positions cannot be overlooked in a consideration of etiology. Among the twenty cases under consideration, eight occurred in patients with posterior positions of the occiput.

TABLE II. POSITION

LOA	ROA	ROP	LOP	SLP
4	8	6	2	1 (twins)

We have not encountered face, brow, or transverse positions in our series, although edema of the cervix has been reported[7] as occurring in these conditions.

Of great importance is the effect upon the duration of labor. It is generally recognized in the scanty literature, as has been mentioned before, that labor may be indefinitely and dangerously prolonged unless the cause of dystocia is promptly recognized and treated.

This observation we believe to be of particular importance where primiparas are concerned. The average length of labor in our cases was twenty-nine hours, which is far in excess of the time usually considered to be normal for primiparas. In the multiparas the lengthening of labor has not seemed to be so important. The average length of labor was 13.5 hours, which we do not consider to be excessive. This would seem to be explained, after analyzing the labors of the five multiparas concerned, in part by the fact that they seem to have been recognized and treated earlier than was the case in the majority of primiparas.

TREATMENT

The treatment has consisted either in lifting the edematous cervix over the occiput and behind the symphysis followed either by spontaneous or operative delivery, or in Duhrssen's incision followed by operative delivery.

TABLE III. TREATMENT

Cervix lifted over the occiput (5)	
Spontaneous (cervical dilatation 8 to 9 cm.)	3
Low forceps	1
Version, extraction (cervix lifted over after-coming head)	1
Duhrssen's incisions of the cervix (15)	
Midforceps (cervical dilatation 3 to 7 cm.)	4
Version, extraction	11

Obviously the simplest method of treatment is to lift the cervix over the occiput and behind the symphysis, holding it in this position until a succeeding pain or two makes its prolapse impossible on account of the advance of the head. This is possible when the edema involves chiefly the anterior lip, and when dilatation is practically complete at the time that the condition is discovered, and when the patient's condition is still sufficiently good that labor will still progress.

There are encountered, however, cases in which this simple procedure is not applicable because dilatation of the cervix is not sufficient to make it possible. In most instances we have found that dilatation will progress sufficiently before the appearance of the edema to make the use of Duhrssen's incision safe. If the edema is diagnosed sufficiently early so that the patient is not exhausted from protracted ineffectual labor, the prompt employment of this procedure, followed by operative delivery, at this, the most favorable time that can be expected, is advised. If on the other hand the condition is first discovered when the patient is exhausted from long labor, adequate supportive measures and possibly morphine rest should be given before attempts at delivery.

MORTALITY

There was no maternal mortality. Five patients had temperatures of 100.4° F. for twenty-four hours or more. Two babies were stillborn and one died seven hours postpartum, a rate of 14.8 per cent. Of the three infants who died, autopsies were performed on two. In one the cause of death was stated as "intracranial hemorrhage with tentorial tears," the other was reported as "atelectasis neonatorum." In the case of the third baby no autopsy could be obtained, but clinically death was due to cerebral hemorrhage.

SUMMARY AND CONCLUSIONS

Acute edema of the cervix occurring during pregnancy is a very rare obstetric complication, usually of short duration and not a com-

plicating factor in labor. Very little active treatment is required. It is probably angioneurotic in origin.

Acute edema of the cervix during labor results in serious dystocia more commonly than is usually supposed. The etiologic factors are multiple. Prompt recognition and treatment are imperative to avoid high fetal mortality and maternal morbidity.

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1807 David Whitney Building

THE INCIDENCE OF URETERAL STRICTURE IN LOWER ABDOMINAL PAIN IN WOMEN*

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INTEREST in ureteral stricture was first stimulated by Hunner, who, in 1916, reported a series of 50 patients with ureteral stricture and in 1918 a series embracing 100 patients. Following these two presentations, he wrote numerous papers on the various[6-12] aspects of ureteral stricture. Laws[13] in 1926 presented a series of 50 patients among whom were 8 with stenosis, one with traumatic stricture, two with ureteral anomalies, and 18 with ureteral calculi.

Fetterman[14] in 1932 reported a series of 1,164 patients of whom 471, or 44 per cent, were proved cases of referred ureteral pain. Stevens and Henderson[15] in 1929 reported an incidence of 11.3 per cent of ureteral stricture among their urologic patients. In 1928 Ginsberg[22] reported a short series of cases emphasizing abdominal symptoms. In 1927 Schreiber[16] reported his findings in a series of 100 consecutive autopsies designed to determine the frequency of ureteral stricture and found a total incidence of 25 per cent (21 were children). However, in analyzing the 79 adult cases, he found that 25, or 31 per cent, had stricture. Frater and Braasch[17] in 1929 examined 93 unselected cases (48 males, 35 females) at autopsy, removing both kidneys and ureters, but it is not clear whether or not that portion of ureter passing through the broad ligament had also been removed. No percentage was given but they stated that the incidence of lesions of the ureter was greater than had been previously recognized. In a series of 739 patients examined, Rathbun[18] found 92 cases of stricture (12 per cent).

*Read at a meeting of the Obstetrical Society of Philadelphia, October 1, 1936.

The observations herewith presented refer to patients studied in the Gynecologic Ward and Out-Patient Service of Dr. Brooke M. Anspach at the Jefferson Medical College Hospital. The majority were referred to the cystoscopic clinic in an effort to determine whether or not the cause of the patient's lower abdominal pain was of genitourinary origin. Definite lesions of the pelvic organs (uterus and adnexa) had to be eliminated. The differential diagnosis from so-called "chronic appendicitis" was an equally important factor. A certain number of the patients seen were admitted to the Gynecologic Ward for further study.

The procedure followed in making the examination consisted of: (1) Complete gynecologic history, (2) complete urologic history, (3) abdominal examination, (4) pelvic examination, (5) pyelography, and (6) ureteral catheterization.

In the study of earlier patients, x-rays and pyelograms were not done in every instance, but in the more recent cases attempt has been made to obtain intravenous or retrograde pyelograms whenever possible.

I prefer an intravenous to a retrograde pyelogram in my preliminary study of patients in whom I suspect stricture, because one does not have to contend with the artificial filling and frequent distention of the ureter and pelvis of the kidney incident to a retrograde pyelogram. Furthermore, we do not wish to dilate the ureter with a ureteral catheter prior to viewing a film after excretion urography. In other words, the pelvis, calices and ureters are actually visualized and seen to empty themselves as they normally function.

After the above procedure is carried out, a careful examination is made of the urethra and bladder, and then an attempt made to enter the ureter with a No. 9 or 10 catheter. If this size will not pass satisfactorily, smaller ones are employed until one will pass. If unsuccessful, even with the smallest size catheter, a *provisional* diagnosis of spasm, stricture, valve or kink of the ureter is made, and the patient is instructed to return in a week for further examination. Oftentimes at the second examination even the larger-sized catheter will be found to pass quite readily. If a No. 9 or 10 catheter passes readily without a pull or tug on withdrawal, we do not regard it as a stricture.

Hunner and others rely only on the wax bulb to diagnose stricture, but I feel that if there is a definite obstruction, constriction, stricture, or whatever name may be applied to the condition, it can be diagnosed by one of the larger-sized catheters. Whether or not the x-ray and pyelogram is the final word in the diagnosis of stricture is a debatable question. It would seem to be true that if any type of noncalculous obstruction were present, the ureter would be dilated above the point of constriction. Hunner claims that this is not necessary for diagnosis, and he relies on the characteristic hang on withdrawal of wax bulb. I

have seen many patients in the past five years who have had pain of long standing with or without urinary symptoms and in whom other tests and examinations were negative, including the intravenous pyelogram but who, after having had the ureter catheterized, had complete and almost instantaneous relief. Stevens[15] claims that this type of case is more likely to be one of urethral stricture. However, if a thorough examination of the urethra has been made prior to the ureteral study, and no stricture has been found, one is scarcely justified in considering the urethra to be at fault.

After eliminating a certain number of patients in whom no diagnosis was made because of incomplete studies and lack of cooperation, a total of 136 patients was available as a basis for this review.

The following tabulation shows the incidence of ureteral stricture occurring among those patients totaling 136, referred to the cystoscopic clinic for study:

	NUMBER	PER CENT
Stricture of ureter	26	19.1
Pelvic inflammatory disease	25	18.3
Sacroiliac disease	24	17.6
Nephroptoses	13	9.5
Gallbladder disease	12	8.8
Hydronephroses	7	5.1
Stone in kidney	6	4.4
Pyelitis	6	4.4
Stone in ureter	4	2.9
Scoliosis	4	2.9
Muscular neuralgia	4	2.9
Retention cyst of ovary	5	3.6
Adenomyoma of uterus	3	2.2

Other conditions occurring only once or twice included: Myoma uteri, postoperative adhesions, syphilis, stricture of urethra, cellulitis of broad ligament, mucous colitis, descensus uteri, endometriomas, incisional hernia and pendulous abdomen. In some cases, more than one diagnosis was present, which accounts for the larger number of diagnoses, than our total of 136 cases. Pelvic inflammatory disease was most frequently encountered next to ureteral stricture. These were usually old cases with doubtful lesions often referred from other departments.

It must be remembered that in this group of patients many were referred from the gynecologic department proper, and other pathology had been largely eliminated; they were usually referred with the provisional diagnosis of ureteral stricture. This possibly accounts for the apparently high number of stricture cases. These cases were selected from a group of clinic and ward patients whose chief symptom was pain in the lower abdomen. We do not include patients in this group who did not have lower abdominal pain, even if they did have ureteral stricture. The group listed under sacroiliac disease also comprises some in whom the diagnoses of lumbar arthritis and scoliosis were made.

It is interesting to note at this time the teaching of the late Dr. J. B. Carnett.[20] His views on the subject of abdominal pain are very well

known, but he felt that many cases of abdominal pain were caused by muscular neuralgia, originating in the intercostal nerves. He also believed that most cases of this clinical entity were caused by either (1) lumbar arthritis, (2) scoliosis, (3) exaggerated lordosis or sacroiliac disease, the most frequently offended nerve being the first lumbar.

We are aided in eliminating these factors by the use of the simple tests which he devised, palpation of the tensed abdominal muscles and the pinch test.

Thirteen patients had definite nephroptoses. This diagnosis was not made unless there was a pronounced degree of ptosis and other pathology had been eliminated. Gallbladder disease was encountered 12 times which stresses the importance of complete history and physical examination, prior to special examinations and tests. On analyzing the 26 cases of stricture we found the following: Right side 25, left side 1, married 19, multiparas 14, and nulliparas 12.

In view of the recent studies on the genitourinary tract during pregnancy, we now know that in practically all cases the ureters are greatly dilated and we also know that this is not entirely due to pressure. There is a degree of atony present which can be loosely explained as being hormonal[21] in origin. Whether or not this is the cause is not pertinent to this discussion, with the exception that possibly the same hormones which cause the uterus to become atonic may also apply to the ureters. After pregnancy is terminated, the uterus, uterine ligaments, and other pelvic tissues involute. We know, however, that no matter how skilled the obstetrician, certain marks of pregnancy remain regardless of how normal the case was or how efficiently the obstetrician repaired the perineum. The question, therefore, comes up as to how much change, which is imperceptible to our senses, has remained after the pregnancy. There are cases in which involution is incomplete and involution now includes also the return to normal of the genitourinary tract.

This might explain some of the cases of ureteral stricture in women who had borne children but not in the nulliparous.

I fully appreciate the pitfalls encountered in establishing a diagnosis of ureteral stricture, and have tried to avoid this by preliminary routine history, physical and pelvic, ureteral study and pyelogram. Oftentimes after these studies, one is in doubt, especially in borderline cases in which the stricture is not sufficiently well developed, to cause a frank distortion on the x-ray plate. It is this type of case that must be watched; if there is no improvement in condition after two or three ureteral dilatations, we make it a point to review the whole case once more and make a more thorough search for focal infection, sacroiliac disease, scoliosis or lordosis, or residual inflammatory disease. Patients who did not respond to treatment, or were doubtful cases, we have not accepted in this series.

I would like to present a few representative case histories to illustrate one or two important points.

CASE 1.—A. M., aged twenty-three years, complained of urinary frequency, pain in vagina and on right side, and dysmenorrhea. These symptoms had been present for several years. She had consulted several physicians and was finally referred to me for ureteral study. Abdominal examination negative, except for deep tenderness over the brim of pelvis on right side. Infected Skene's tubules (repeatedly negative for gonococcus) and congenital erosion of cervix noted. Intravenous pyelogram performed on Mar. 8, 1934, showed a greatly dilated right ureter with constriction at vesical end.

Dilatations of the ureter gave relief to right-sided pain temporarily but soon would recur. Being rather undernourished, and not responding as she should with dilatations, we felt that removal of all foci of infection might aid. We therefore had her admitted to the Jefferson Hospital (August, 1935) and performed dilatation, curettage and cauterization of the cervix, excision of Skene's tubules, and tonsillectomy. The patient was seen again in November, 1935. She was symptom-free and the intravenous pyelogram showed the right ureter to be quite normal. She was still symptom-free in August, 1936. It would appear that in this case, the focal infection had some bearing on the etiology.

CASE 2.—E. H., aged forty years, married. She had one pregnancy in 1922. Soreness in right side since 1923. She was sent to Jefferson Hospital for study. She dated onset of pain since childbirth in 1922 and has had no relief, and during past two years, pain has become worse. Also complained of slight frequency of urination. Pelvis, negative. Intravenous pyelogram showed a hydroureter with a stricture at lower end. On Aug. 14, 1933, a No. 9 catheter was passed and became obstructed 6 cm. above the right ureteral orifice, and her pain was definitely reproduced. August 23, a No. 7 catheter was passed after a No. 9 again failed to pass. August 29, tonsillectomy was performed. The tonsils were small and did not seem particularly diseased. August 31, a No. 8 catheter passed up the right ureter with difficulty after a No. 9 again failed to pass. She had much less pain on right side. Patient was discharged and told to report for readmission in six weeks. Readmitted October 15. She had no more pain. Intravenous pyelogram was repeated and the ureter was found to be normal in size. Patient was discharged. In follow-up visits in April, 1934, and January, 1935, the patient was free of symptoms.

The symptoms in this case date from time of delivery, and I believe that in this case the ureter at the point where it passes through the broad ligament or the tissues in the broad ligament failed to undergo involution properly. In other words, the broad ligament in the region possibly underwent some degree of fibrosis, causing a diminution in the caliber of the lumen of the ureter. It is at this point that most strictures are found in the female, and in our series of stricture cases, in those who had borne children, the obstruction was from 3 to 6 cm. above the ureteral orifice in every instance, while in the nongravid group, the obstruction was higher up in 75 per cent of the cases.

Space does not permit the citation of more case histories, and the cases cited above will serve to illustrate two very important types of cases.

SUMMARY

Twenty-six patients in a series of 136 cases having lower abdominal pain, proved to have ureteral strictures.

Ureteral stricture should be considered as a possible diagnosis in all cases of chronic lower abdominal pain in women.

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DISCUSSION

DR. FLOYD E. KEENE.—When Hunner first reported on ureteral stricture, I was actively engaged in cystoscopic work and despite diligent efforts, I was unable to demonstrate the lesion in anywhere near the high percentage which he reported. During recent years, Eaton has been in charge of this branch of our service and his experience seems to confirm mine. During the last four years, some 1,300 patients have reported to the Cystoscopic Clinic and of these the diagnosis of ureteral stricture was made only 39 times.

Of course, the crux of the matter is one's interpretation of what constitutes a stricture or in other words, upon what data is one warranted in making a diagnosis? I cannot accept the view of Dr. Hunner and his followers regarding the diagnostic importance of what he terms the "hang" on withdrawing the wax tip of a catheter. It seems to me that this may occur in a normal ureter and is but an expression of resentment on the part of the ureter to the trauma incident to the passage of the large catheter. I have always contended that with a stricture of such narrowness as to produce obstructive symptoms, there should be a dilatation of the ureter above the obstruction, particularly if these symptoms be of long standing. To my way of thinking, the evidence which warrants the diagnosis of stricture consists of a tender and often palpable vaginal segment of the ureter, a partial or complete obstruction to the passage of a No. 6 or No. 7 catheter, the reproduction of the typical pain on passing the catheter and the urographic demonstration of a fixed point of narrowing in serial films with dilatation of the ureter above it. In carrying out the diagnosis and treatment of this lesion, one cannot urge too strongly gentleness of manipulation.

I would emphasize one point which this paper brings out and that is the importance of complete urinary studies in cases of obscure pain in the lower abdomen. Many normal ovaries and appendices have been removed through neglect to observe this course, the actual lesion being somewhere in the urinary tract. This applies with equal force to the interpretation of urinary symptoms in the absence of definite pelvic pathology. It has been my custom to have a cystoscopic examina-

tion made on all patients with pelvic lesions, presenting urinary symptoms irrespective of the nature or extent of the pelvic pathology. In the majority of cases, alteration in the urinary tract will be of a purely secondary nature. On the other hand, our efforts will be rewarded in a considerable proportion of cases by finding a lesion in the bladder, ureter, or kidney which may have been unsuspected and which in fact may dominate the entire situation, making the pelvic lesion of purely minor significance.

DR. FAITH FETTERMAN.—In the last four years, since our 1932 presentation, 1,120 cases have been added to our series and the actual incidence of ureteral stricture has been, instead of 44 in 1,164 as in 1932, 23 in 1,120. Our criteria have gradually narrowed and we have decided we must demonstrate an actual obstruction which is not a spasm and not due to irritation.

The interpretation of lower abdominal pain may be helped by three points which we have observed in our clinic. In the first place, all intraperitoneal organs covered or nearly surrounded by peritoneum interpret their pain through the peritoneum, in the form of involuntary abdominal rigidity. Retroperitoneal organs on the other hand manifest their disturbance along the lines of cutaneous nerves or through other viscera. In the differential diagnosis of lower abdominal pain, this point serves to distinguish, for example, pain of appendiceal from that of ureteral origin. Another point is that a ureteral lesion is practically always bilateral in its manifestation. If a careful history is taken, the pain is found to be not one-sided, but generally bilateral. Whether this is sympathetic or actual, I do not know. Another point that has been helpful is that a symptom often observed, namely, pain in the side when the bladder is full, points to a lesion in that ureter. These three points have helped me tremendously in the differential diagnosis of lower abdominal pain even before any urinary tract diagnosis has confirmed urinary pathology.

DR. H. M. GINSBERG.—I believe we lay too much stress on the number of cases seen and forget the fact brought out by Dr. Hunner over fifteen years ago: that obstructed ureters are the commonest cause of obscure abdominal pain in women and that useless operations are continually being performed on these urologic patients.

At the Jefferson Hospital we do not believe that by passing a No. 6 or No. 7 catheter up the ureter you will be able to rule out a strictured ureter unless it is very marked. Furthermore, a large number of patients with this condition are being overlooked, when dependence is placed entirely upon an intravenous pyelogram without a cystoscopic examination. The urinary findings may also be misleading, for very often there are no white blood cells, but specimens collected from the kidney practically always show epithelial cells.

It is very important to study the ureters in persons in whom large doses of radium have been used in the cervix, as very often there may develop a pyonephrosis secondary to a marked strictured ureter.

DR. JOHN McGLINN.—I remember very well the controversies Hunner started when he stressed the necessity of using an air-dilating cystoscope, as against the men who were using water-dilating scopes. At that time I was finding a fair number of strictures because I followed Hunner's method in using air cystoscopes. Keene converted me to the idea that it was a painful procedure to the patient, and after adopting the water type of cystoscope, I found fewer strictures than before.

There is no question that strictures of the ureter occur, even after excluding those which are found after the use of radium for cancer of the cervix. There are a number of patients with lower abdominal pain who are unnecessarily operated

upon, and whose condition clears up after the stricture is dilated. Hunner has shown a number of pathologic specimens in which he demonstrated very definitely ureteral stricture. That strictures occur as frequently as he believes, I doubt, because it seems to me that when a catheter is introduced into the ureter, there is apparently a stricture one time and later a perfectly normal ureter.

DR. LINTGEN (closing).—We do not feel that a diagnosis can be made with a No. 6 catheter. I believe that if a No. 9 or No. 10 will pass without reproduction of pain or without a tug when it is withdrawn that there is no stricture present. We do not feel that a wax bulb is essential for diagnosis. Intravenous pyelography does not always tell us the truth because in some cases where the pyelogram was normal, the symptoms cleared up after dilating the ureter. I have not, however, listed any of those cases in my series.

PITUITARY RADIATION FOR THE RELIEF OF MENOPAUSE SYMPTOMS

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DURING the last ten years three thousand cases were observed in the menopause clinic at Mount Sinai Hospital, and we desire to tabulate the response of this large group to various therapeutic measures. We were impressed by the fact that many patients, who regularly menstruated, complained of severe symptoms including flushes, sweats, and other vasomotor and psychic disturbances, as well as those whose menstruation had long ceased.

It has been pointed out by Fluhmann and others that there is an increase in excretion of gonadotropic hormone during the menopause. This may be present with or without unusual vasomotor or psychic disturbances. It has also been shown that an estrogenic hormone may be present in the blood and urine during the menopause, even in those instances where symptoms are pronounced. It is evident that factors other than the withdrawal of estrin or the increase of gonadotropic hormone must be considered as active in the production of symptoms. We do know that following castration, and in the menopause, definite histologic changes, more or less constant, are found in the pituitary. The gland is enlarged and contains the so-called castration cells. It would seem logical that if the pituitary secreted not only an excess of gonadotropic hormone but some other factor, any method that would reduce this excess secretion might be helpful and might control, at least to some extent, the distressing symptoms of the menopause. It has long been suggested by many investigators that the exhibition of estrogenic factor would prove of benefit in the treatment of the menopause syndrome. This has proved to be so, and the result of treatment in a great many cases has been satisfactory. We have noticed that a certain proportion

of patients receiving treatment with estrogenic factor were not benefited, and it was decided to radiate the pituitary in these cases with the expectation of reducing the pituitary activity, and thus possibly relieving these patients of their symptoms.

In two cases studied by Dr. Spielman he failed to find an appreciable variation in the gonadotropic hormone excreted after the pituitary radiation. However, these tests were carried out at a time when methods of determination were rather crude, so that definite conclusions cannot be drawn. In addition to these two observations, one of us (S. H. G.) had an occasion to study the histology of a pituitary which had been carefully and extensively radiated for a basophilic adenoma. The examination of the gland failed to reveal any histologic changes that could not be accounted for by the sex and age of the patient. However, it is possible that a gland may be physiologically abnormal without this abnormality reflecting itself in a detectable histologic change. Because of the apparent rôle played by the pituitary in the production of the menopausal syndrome, it has been suggested that x-ray therapy, directed toward reducing the activity of the pituitary or in some other way influencing its activity, might be beneficial.

Groedel of Nauheim originally suggested radiation of the ovary in the menopause and reported good results. Subsequently Werner of the Vienna school employed radiation of the pituitary and thyroid either alone or in combination and also obtained good results. Borak and Grabowski also suggested that the combination of pituitary and thyroid radiation might give better results than either alone. Goldhammer and Blass stated that the pituitary radiation does not effect the excretion of gonadotropic hormone in the urine. In addition they had one case in which they could study the morphologic changes in the pituitary gland following radiation but were unable to detect any variation from the normal. Numerous other authors have had similar experiences and results. Collins and his coworkers reported a series of cases, with encouraging results. It must be noted that the follow-up observations in many instances were not of sufficient duration to permit conclusions as to the permanency of the results. In some of the cases a second series of treatments was necessary, and Collins has reported that in this group he obtained permanent success.

We treated a series of 75 patients and in addition utilized an additional 25 cases as controls. The control group was exposed in exactly the same manner as the patients receiving actual treatment except that the rays were screened out. Only one of the 25 control patients reported that she felt better for a few weeks. The other 24 had no beneficial effect. The technic employed at Mount Sinai Hospital was as follows:

	"R" UNITS	K.V.	M.A.	FILTER	FOCAL DIST.	TIME IN MINUTES	SIZE OF FIELD
L. Temporal	150	180	4	½ Cu. 1 Al.	40	7⅝	6×8
R. Temporal	150	180	4	½ Cu. 1 Al.	40	7⅝	6×8
Frontal	150	180	4	½ Cu. 1 Al.	40	7⅝	6×8

In the 75 patients treated, there was an equal number of natural and artificial menopause cases. In the artificial menopausal group there was approximately an equal number of surgical and x-ray castrations. We have followed these patients for a period of over two years.

RESULTS

Ninety per cent of the patients lost the hair about the temporal region. In 85 per cent of the cases, sweating, a very common symptom, was markedly decreased and in 20 per cent completely disappeared. Seventy-five per cent of the patients claimed a moderate diminution in the frequency of the flushes. Some stated that after having had 15 to 20 flushes daily they were completely relieved. In 50 per cent of the cases, headaches, either frontal or occipital, were relieved and in some instances apparently cured. In 25 per cent general nervousness and dizziness apparently improved. Palpitation on exertion was relieved in about 10 per cent. The outstanding symptom that was not ameliorated to any degree was the pseudarthritic pain so commonly present. All the above improvements lasted from two to six weeks following a series of three x-ray treatments. The symptoms then gradually returned, though in some instances not as marked as before treatment. It was necessary to continue treatment and in six instances seven series of treatments were given, amounting to twenty-one exposures. Following each series given, an amelioration of symptoms for about six weeks resulted. It was deemed unwise to attempt any additional radiotherapeutic treatment. These patients, when symptoms recurred after the limit of x-ray was given, received injections of progynon-B with marked benefit. This series of patients treated with progynon-B will be reported upon at a later date. Six patients had vaginal bleeding after one application of x-ray to the pituitary. Whether or not this indicates a stimulation of ovarian function through the hypophysis is purely hypothetical. The results obtained by x-ray treatment apparently were in no way dependent upon the duration of menopause.

To summarize, we can say that radiation of the pituitary gland with the technic indicated will invariably relieve the patient for a period of from two to six weeks. The treatment is limited because only a restricted number of exposures can be given. The result of treatment indicates that there is a relationship between the pituitary and menopause syndrome.

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CONGENITAL ATRESIA OF THE ESOPHAGUS WITH TRACHEO-ESOPHAGEAL FISTULA (3 CASES)*†

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THE three cases of congenital atresia of the esophagus with tracheo-esophageal fistula herein reported have occurred on the Obstetrical Service of The Long Island College Hospital during the past two years. Either this frequency is unique in our material or the diagnosis heretofore has been overlooked. A knowledge of the characteristic clinical syndrome produced by this malformation should lead to its recognition. Often the symptoms are so typical that a diagnosis can be made soon after the condition is suspected. On the other hand, the aspiration pneumonia which usually results in the death of the infant in from one to ten days frequently is regarded as the primary disease, and in the absence of an autopsy the true nature of the condition accordingly is not discovered.

The author reported the pathologic aspects of eight cases of congenital atresia of the esophagus in 1931[1] and, in collaboration with a pediatrician, presented the clinical aspects of the same cases in 1932.[2] A survey of the literature shows that clinicians have reported cases soon after attendance at a medical society meeting where the anomaly was presented. This report of three cases is presented not so much to describe a congenital malformation which has been described adequately in the literature many times,[3-6] but rather to call to the attention of obstetricians the frequency of occurrence of the anomaly and the ease with which a diagnosis can be made.

CASE 1.—Baby Girl W. The mother was a twenty-four-year-old primipara who delivered spontaneously and prematurely after a short labor, on May 5, 1934. There was no hydramnios. The placenta showed a velamentous insertion of the umbilical cord. The infant weighed 2,180 gm. at birth and with the exception of a considerable amount of mucus in the pharynx, appeared grossly normal. The nurse noted difficulty in passing a tube for gavage, and feedings were regurgitated through the mouth and nose. On the second day, roentgen visualization of the esophagus after the injection of a barium mixture showed it to end in a blind pouch at the level of the third dorsal vertebra. X-ray examination of the thorax and abdomen on the following day revealed gas in the intestinal tract. A Witzel gastrostomy was performed on the third day. Intermittent distentions of the stomach with repeated respiratory inspirations were observed at the time of operation. This further confirmed the presence of a tracheo-esophageal fistula, first suspected when gas was seen in the intestines on x-ray examination. Clyses and a transfusion were given as supportive measures. Postoperative feedings through the gastrostomy tube caused choking and cyanosis. Respirations became rapid and labored and the infant died five days after birth.

On postmortem examination, the upper portion of the esophagus ended as a blind, hypertrophied pouch measuring 3 cm. in length and 1 cm. in width. There was no cord connecting the upper and lower portions of the esophagus. The lower esophagus measured 3.5 cm. in length and was connected by a fistulous tract to the trachea a few millimeters above its bifurcation into the bronchi. The lungs showed

*Presented at a meeting of the Brooklyn Gynecological Society, November 6, 1936.
†A fourth case has recently occurred in this service.

atelectasis and bronchopneumonia. Other than the absence of the innominate vein and the presence of the left anterior cardinal vein, no further abnormalities were noted.

CASE 2.—Baby Boy C. The mother, a thirty-five-year-old primipara, was admitted in labor on Nov. 25, 1935. She was delivered by forceps because of fetal distress. The infant weighed 2,500 gm. at birth and appeared somewhat asphyxiated. The placenta was normal. There was no hydramnios.

On admission to the nursery, a large amount of mucus was noted in the mouth and pharynx. Gavage caused cyanosis and repeated attempts at feeding resulted

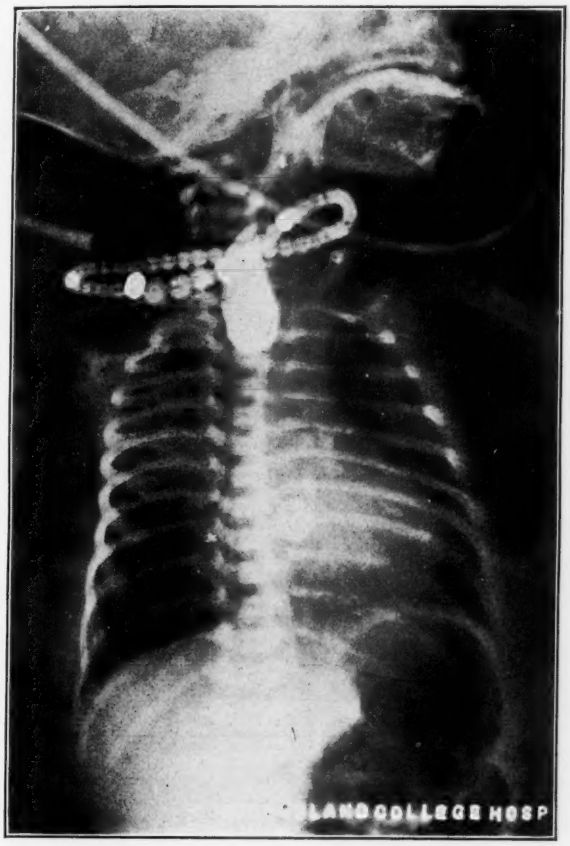

Fig. 1.—The upper esophageal sac has been filled with barium and visualized by the x-ray. Note the presence of gas in the stomach.

in regurgitation through the nose and mouth. On the second day, the infant appeared jaundiced and dehydrated. The diagnosis of atresia of the esophagus was suspected and clyses were given. On the fifth day, roentgen examination of the esophagus, after the injection of a radio-opaque material, showed a definite obstruction opposite the region of the bifurcation of the trachea (Fig. 1). There was a considerable amount of gas in the stomach and small intestines. No operative procedure was attempted. The subsequent course of the child was characterized by progressive cyanosis and dehydration until death occurred on the ninth day.

Postmortem examination showed the upper portion of the esophagus to be represented by a blind pouch measuring 4 cm. in length and 1 cm. in diameter. Its

wall was markedly hypertrophied. No cord of tissue was seen extending from this blind end caudally. The trachea, at its bifurcation, was divided into three divisions, two lateral bronchi and a mesial esophagus, which joined the stomach in a normal manner. This portion of the esophagus measured 5 cm. in length and 5 mm. in diameter. Bronchopneumonia was present.

CASE 3.—Baby Boy B. The mother was a twenty-eight-year-old white multipara who had previously delivered two normal infants spontaneously. Hydramnios, first noted in the prenatal clinic, suggested the presence of a monster, but x-ray examination of the abdomen showed what appeared to be a normal fetus. After a normal labor, the patient spontaneously delivered a 2,940 gm. infant on May 16, 1936. The placenta showed no abnormalities.

A large amount of fluid in the mouth and pharynx was noted soon after delivery, and repeated attempts were made to remove it by aspiration. There was constant

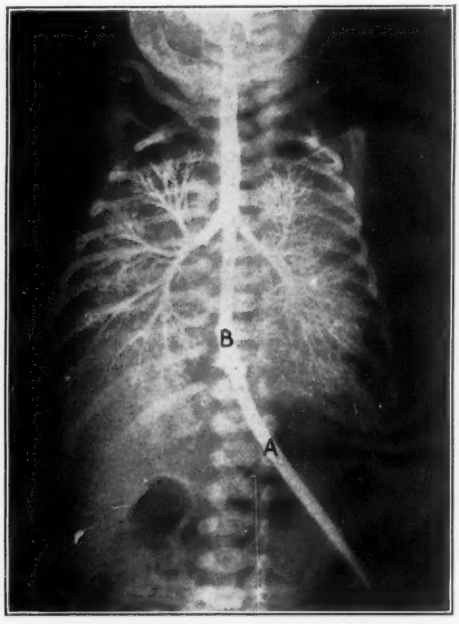

Fig. 2.—As described in the text, lipiodol has been forced into the lower portion of the esophagus *B*, through the catheter *A*, and can be seen in the tracheobronchial tree. The tracheo-esophogeal fistula is thus demonstrated.

drooling of thick, yellowish brown mucus from the nose and mouth. Many moist râles were heard over the entire chest. On the first attempt to feed the child lactose water, the latter was regurgitated together with a large amount of mucus. Repeated attempts to feed the child were followed by regurgitations. On the second day, an attempt was made to pass a catheter into the stomach, but an obstruction was met. Strong pressure used to force saline through the catheter caused it to return immediately through the nose and mouth. Roentgen and fluoroscopic examination after the introduction of radio-opaque fluid into the esophagus showed a complete obstruction between the second or third dorsal vertebrae. There was a considerable amount of gas in the stomach and intestinal tract, indicating the presence of a tracheo-esophageal fistula. On the third day, a gastrostomy opening was made in the lower half of the stomach, and a tube inserted for feedings. A similar opening was also made in the upper half of the stomach, which was divided

from the lower by a row of sutures running from the lesser to the greater curvature. During the operation, while the stomach was open, repeated inspirations of the infant were noted to cause bubbling from the gastrostomy wound, confirming the presence of a tracheo-esophageal fistula. The operative procedure was conceived and performed by Dr. Albert Ritzmann, resident surgeon at The Long Island College Hospital, who will report this case from a surgical viewpoint.

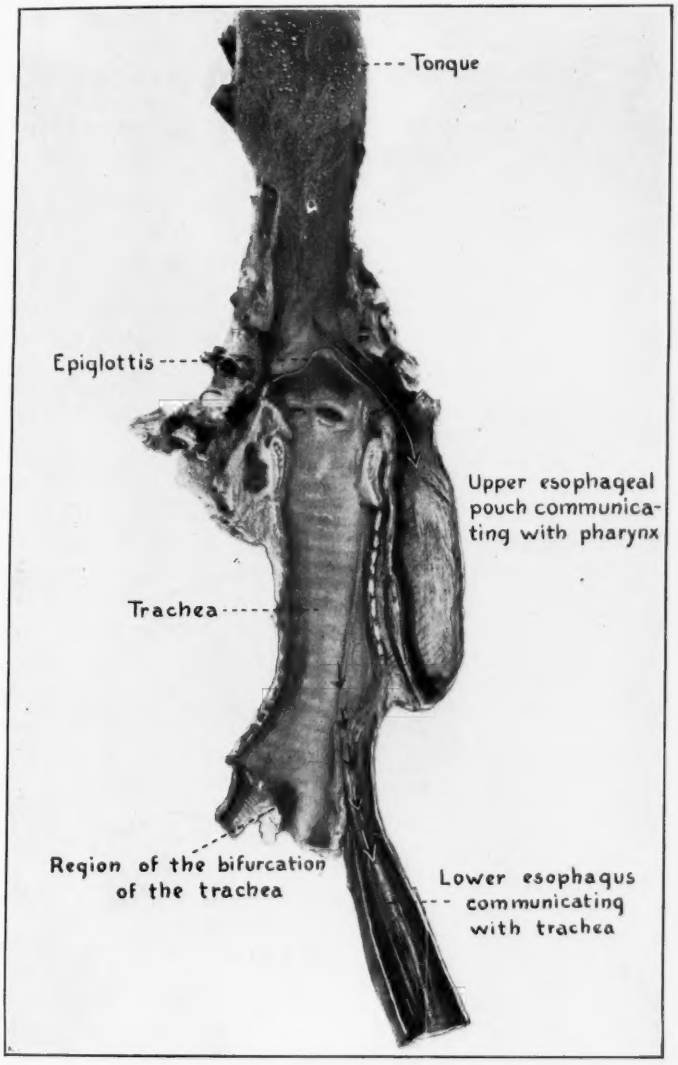

Fig. 3.—A retouched photograph of a specimen reported previously, showing the characteristic gross morphology of the malformation.

Postoperatively, the child did well. Mucus still came from the nose and mouth but the chest was relatively clearer. Feedings were taken well through the gastrostomy tube and did not cause the choking and cyanosis noted in the case of Baby W. Four days after operation, however, the general condition of the child became poorer. The chest was again filled with moist râles and attacks of cyanosis were noted. The child died on the eighth day of life.

After the death of the child, a catheter was tied in the lower portion of the esophagus and 10 c.c. of lipiodol was injected into the lower portion of the esophagus while pressure was made on the larynx. The striking x-ray demonstration of the tracheo-esophageal fistula may be seen in Fig. 2.

Postmortem examination revealed the upper portion of the esophagus to end in a blind pouch measuring 3 cm. in length and 1 cm. in diameter. The wall was moderately hypertrophied. The trachea was divided into three tubes, two lateral bronchi and a mesial tube, which formed the lower portion of the esophagus. This part of the esophagus measured 6 cm. in length, 5 mm. in diameter, and joined the stomach in a normal manner. The stomach was divided as noted above and each portion showed a stoma. The respiratory tract showed tracheobronchitis and bronchopneumonia. An anomaly of the right thumb was also noted.

A detailed account of the gross and microscopic pathology, a recapitulation and discussion of the theories of development of the anomaly, and a presentation of a new interpretation, based on studies of human embryos from the collection at the Carnegie Institution of Washington, have been previously reported.[1] Within an experience of six years, eleven gross specimens of the anomaly have been examined by the author. All have closely resembled each other, showing the morbid anatomy of this malformation to be markedly constant.

SUMMARY AND CONCLUSIONS

1. Three cases of congenital atresia of the esophagus with tracheo-esophageal fistula have occurred within a period of two years on an obstetric service where 1,200 women are delivered yearly. It is probable that many cases escape true diagnosis.

2. The obstetrician often has the opportunity of observing the first clinical sign of the malformation, namely, the presence of a large amount of mucus in the mouth and pharynx of the newborn, and difficulty in clearing the respiratory passages by aspiration.

3. The most characteristic and constant symptom is the regurgitation that occurs after each feeding, often accompanied by coughing and cyanosis.

4. The diagnosis can be easily confirmed by the passage of a catheter into the esophagus and roentgen visualization after the introduction of a radio-opaque fluid.

I am deeply indebted to Dr. George W. Phelan and to Dr. Morris Glass for their kind permission to report their cases.

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350 HENRY STREET

PRIMARY CHORIOMA OF THE OVARY

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THAT primary chorioma may develop in extrauterine sites following pregnancy is adequately proved by numerous isolated records, although the incidence is very low. About 2.6 per cent of choriomas are preceded by ectopic pregnancy.[1] The histogenesis of others is explained on the basis of hematogenous transportation of normal placental elements from the uterus to different parts of the body where they subsequently undergo malignant change.[2] A still smaller group of primary ectopic choriomas arise without any preceding pregnancy and are of teratomatous nature, their origin in the ovary being analogous to chorioma of the testis. Klaften[3] collected reports of 7 such ovarian tumors occurring in females whose ages varied from seven to eighteen years, and adds a complete record of an ovarian chorioma in a child of eleven years who came under his observation. In all 8 of these cases the factor of pregnancy was adequately ruled out. Most of the tumors in this group as well as in a somewhat larger group of adults consist not only of chorioma but also of an admixture of other tumor elements derived from one or more germ layers. In addition to the cases reviewed by Klaften, Maki and Takeda[4] report a case of primary ovarian chorioma in a twenty-one-year-old virgin.

The following case is placed on record because of the rarity of primary ovarian chorioma and as a basis for discussing several diagnostic problems:

M. D., a married white female, aged twenty-two years, was admitted to the St. Francis Hospital on Feb. 18, 1935, with the complaint of lower abdominal pain and vomiting. The family history was irrelevant. There was a remote history of measles and tonsillectomy. She had leucorrhea during the past year and a Bartholinian abscess was incised and drained in March, 1934. Menses were established at the age of fourteen and had been regular, painless, and of four days' duration every twenty-six to thirty days until February, 1934, when there was amenorrhea for six weeks followed by sudden onset of bleeding with the passage of clots, lasting fourteen days. Menses were then resumed at regular intervals until the present illness. Her last normal period occurred on Nov. 18, 1934, and lasted four days. A normal amount of blood was passed without clots and without pain. She had been married for two years but never, to her knowledge, had been pregnant.

Present Illness.—On Dec. 1, 1934, vaginal bleeding occurred two weeks prior to the expected period and continued throughout the month with the passage of a moderate amount of blood. There was no bleeding during January. On Jan. 14, 1935, there was a sudden onset of right lower abdominal pain radiating to the back. She became weak and fainted but passed no blood. Following this she had discomfort in the lower abdomen. Morning nausea and vomiting and slight tenderness of the breasts without appreciable enlargement were noted two weeks later. Vaginal bleeding again occurred on Feb. 6, 1935. It was painless, there were no clots, lasted one week and was interpreted by the patient as menstruation. No blood was passed by vagina after this. Slight dysuria and severe constipation developed rapidly and she came to the hospital on Feb. 18, 1935.

Physical Examination.—The patient was a well-developed and fairly well-nourished young white adult female. The heart, lungs, head, extremities, neck, and skin were normal. The breasts were well developed. The areolae were dark pink and no secretion could be expressed from the nipples. The reflexes were normal. There was no enlargement of the superficial lymph nodes. By abdominal examination a cystic, regular, nontender mass was palpable in the right lower quadrant of the abdomen. No other masses or organs were palpable. Inspection showed an introitus of marital type and a mucosa of normal color. The cervix was soft and not lacerated. By bimanual examination the uterus was normal in shape and consistency but slightly enlarged. The left adnexa was normal. In the posterior culdesac there was a large, semisoft, slightly tender mass, apparently connected with the right tube and ovary and almost completely obstructing the rectum. The uterus was anterior and to the left of the mass. There was no blood.

Laboratory Findings.—A catheterized specimen of urine was normal. Wassermann and Kahn tests were negative. Blood examination showed 3,250,000 red cells with 68 per cent hemoglobin and 5,200 white cells with 80 per cent polymorphonuclear leucocytes, 17 per cent lymphocytes, 2 per cent large mononuclear leucocytes, and 1 per cent eosinophiles. A Friedman test was positive (Feb. 26, 1935).

Operation.—After a preliminary transfusion of 450 c.c. of citrated whole blood, on Feb. 27, 1935, the abdominal cavity was opened through a low midline incision. A hemorrhagic cyst about 16 cm. in diameter was found adherent by a soft vascular friable base to the uterus and tissues of the posterior culdesac. The tumor was removed with difficulty and much difficulty was encountered in controlling the generalized ooze of blood over the area from which the mass was stripped. This was eventually well controlled. The right tube was removed with the tumor mass and appeared normal. The right ovary was not identified. The left tube and ovary were normal. The uterus was normal in size and shape.

Pathologic Report.—Gross: The specimen consisted of a rounded partly encapsulated mass of old blood and soft gray tissue apparently situated in the broad ligament. The attached tube was slightly congested and edematous. On section the lumen of the tube appeared normal and the fimbriated end was free. There was no gross evidence of ovarian tissue.

Microscopic: Sections of the soft gray portions of the cystic mass showed a typical chorioma consisting of irregular Langhan's cells and syncytium. A section of the tube showed no evidence of tumor. The blood vessels were congested and there was slight edema of the tube wall. The mucosal folds were delicate and essentially normal. No ovarian tissue was found.

Diagnosis.—Chorioma of ovary. Congestion and edema of tube.

Postoperative Course.—The patient recovered from the operation for about ten days; then she began to fail rapidly, the red blood cells and hemoglobin going down steadily in spite of three more blood transfusions. About her fifteenth postoperative day she developed pain in the chest, followed by hemoptysis. X-ray showed metastases to the lungs. Another Friedman test at this time was strongly positive. The patient died twenty-one days after operation.

Postmortem Examination.—March 22, 1935. One and one-half hours after death.

The body was that of a fairly well-developed and emaciated adult white female 166 cm. long. No rigor mortis was present and there was very slight lividity. The pupils were round, regular, and unequal. The left measured 0.5 cm. and the right 0.3 cm. in diameter. The nose, ears, and mouth were not remarkable. No superficial lymph nodes were palpable. A midline lower abdominal scar extended 14 cm. above the symphysis and a small sinus 1 cm. in diameter was present, near its lower end.

Peritoneal Cavity: The surfaces were smooth and glistening and slightly discolored with old blood, except in the pelvis where, on the right side, there was a soft mass of dark red friable material which extended from the region of the right ovary to the sinus in the anterior abdominal wall. The viscera were normally disposed. The mesenteric lymph nodes were not enlarged. The diaphragm extended to the level of the fifth rib on each side. The liver projected 2 cm. below the left costal margin, 9 cm. below the xiphoid and 5.5 cm. below the right costal margin.

Pleural Cavities: The left pleural surfaces were smooth and glistening. There were no adhesions or free fluid. The right pleural surfaces were dull and injected. About 25 c.c. of turbid yellow fluid were present. There were no adhesions.

Pericardial Cavity: The surfaces were smooth and glistening. There was a slight excess of thin yellow fluid present. There were no adhesions.

Heart: Normal in shape and position. Slightly dilated. The epicardium was thin and transparent. The myocardium was homogeneous, pale red in color, of normal thickness and soft in consistence. The endocardium was thin and transparent. The ventricles were slightly dilated. The valves and coronary arteries were normal.

Lungs: Both lungs contained numerous round soft dark red tumor nodules distributed throughout. Most of these ranged between 1 and 2 cm. in diameter (Fig. 1).

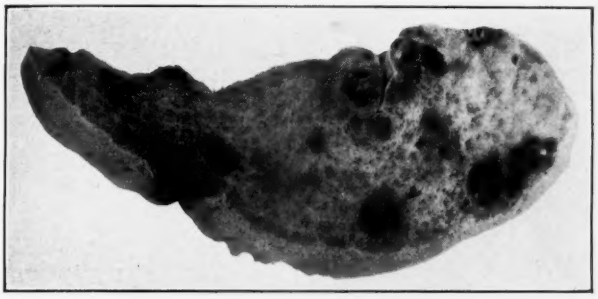

Fig. 1.—Metastatic chorioma of lung.

In the right upper and middle lobes there was a similar nodule about 6 cm. in diameter which extended between the two lobes. The pleural surfaces over this nodule were dull, injected, and covered with fibrin. The lung tissue surrounding the tumor nodules was essentially normal.

Spleen: About twice normal size. The capsule was thin over a smooth dark purple surface, except at the lower margin where there were a few rough projections of tumor similar to that described elsewhere. These tumor masses were about 0.5 cm. in diameter and no others were found in the spleen substance.

Pancreas: Normal in size, shape, color, and consistence.

Liver: Normal in size, shape, color, and consistence. On section three round, dark red, soft nodules of tumor were found in the liver substance. The gallbladder was thin walled and grossly normal.

Gastrointestinal Tract: Two small tumor nodules were present in the wall of the ileum and an elongated mass of tumor material appeared as a thrombus in a small vessel leading to the larger of these masses. On the mucosal surface the larger mass was ulcerated and covered with blood clot. The small intestine contained masses of blood clot and the contents of the larger intestine were black in color.

Adrenals: Normal in size, shape, color, and consistence.

Urinary Organs: The kidneys were similar and about twice normal size, due to numerous tumor nodules distributed throughout each kidney (Fig. 2). The calices, pelves, ureters, and bladder were normal.

Genital Organs: The external genitals were not remarkable. The labia minora and vagina showed no evidence of pathology. The cervix was normal in size and shape and the lips around the slitlike os were slightly soft in consistence. The fundus of the uterus was normal in size and symmetrical. The wall was of normal thickness. The endometrium was grossly normal and showed no evidence of tumor. The left tube was normal in appearance. The left ovary showed no evidence of corpus luteum and appeared as a fibrous and cystic mass 2 cm. in diameter. The right tube and ovary were absent and in their place was a soft friable dark red mass of tissue similar to the tumor described elsewhere. This tissue was mixed with old blood clot and apparently extended forward to the sinus in the anterior abdominal wall.

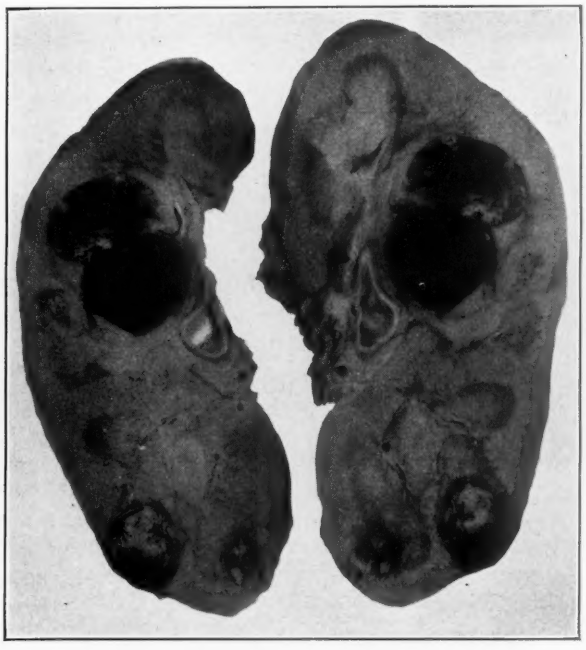

Fig. 2.—Metastatic chorioma of kidney.

Aorta: Smooth and elastic throughout.

Bones: The ribs appeared normal. Superficial inspection of the spine from the anterior surface and the inner wall of the pelvis showed no evidence of bone metastases.

Lymph Nodes: The abdominal lymph nodes were slightly enlarged, but showed no evidence of tumor.

Summary of Anatomic Diagnosis.—Metastatic chorioma from ovary to lungs, liver, kidneys, and intestinal tract. Anemia.

Histologic Examination.—

Heart: Normal.

Lung: Invaded by numerous masses of tumor cells. The tumor consisted of two types of cells, one resembling Langhans' cells and the other resembling syncytium.

There was marked variation in the size and shape of the tumor cells and each mass was associated with hemorrhage. A few small branches of the pulmonary vessels were occluded with minute tumor thrombi.

Spleen: A section including the roughened peripheral portion showed a mass of irregular cystic spaces filled with flat cells resembling endothelium. The cysts were filled with serous fluid. There was no evidence of metastatic tumor. These cysts apparently represented lymphangioma. Elsewhere the spleen appeared normal.

Pancreas: Normal.

Liver: A section including one of the metastatic tumor nodules showed typical chorioma (Fig. 3).

Adrenal: Normal.

Kidney: The tumor nodule in the section studied was associated with an extensive hemorrhage. Elsewhere the convoluted tubules and capsular spaces were markedly dilated.

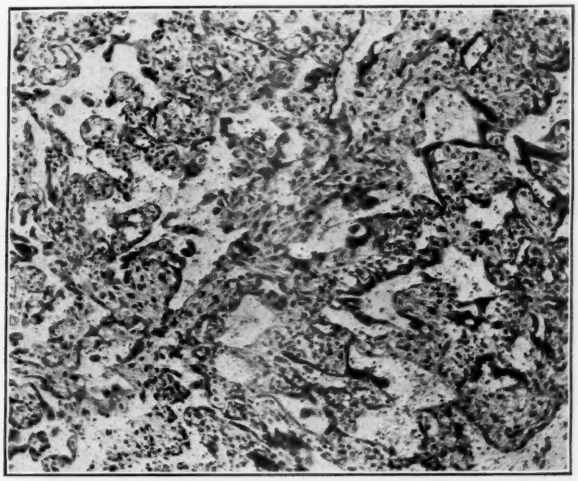

Fig. 3.—Photomicrograph of metastasis in liver.

Left Ovary: Most of the organ was fibrotic. There were a few remnants of corpus luteum, one of which was cystic. The follicles were all very poorly developed.

Uterus: The muscle cells appeared to be of normal size and arrangement. The blood vessels were not remarkable. The endometrium was normal in thickness and the glands showed a normal arrangement. The interstitial cells were likewise normal and showed no evidence of decidua reaction.

Small Intestine: In the section studied there was a metastatic tumor nodule invading the wall and ulcerating the mucosal surface.

Head: Permission to examine the cranial cavity was not granted.

DISCUSSION

On admission, provisional diagnosis of ruptured ectopic pregnancy or ovarian cyst with twisted pedicle was made on the basis of the history of sudden severe abdominal pain and the finding of a mass in the left lower quadrant. The differential diagnosis was confused by the history of morning nausea and vomiting and tender breasts which suggested pregnancy and the presence of menstruation which was

against it. The positive Friedman test was strong support of the diagnosis of ectopic pregnancy and the operation was planned on the basis of this diagnosis. Another problem in diagnosis presented itself at operation when it seemed apparent that the tubes were essentially normal. The absence of fetus and membranes in so large a mass led to the diagnosis of tumor. This was confirmed by microscopic examination of the surgical specimen. Aschheim[5] demonstrated that the content of anterior pituitary hormone in the urine is far higher in chorioma than in normal pregnancy. While a routine Friedman test is of no value in differentiating chorioma from hydatidiform mole or pregnancy, a persistently positive test after removal of all gross tumor is valuable evidence that removal was actually incomplete. The rapidly fatal outcome following the second positive test was, therefore, expected.

The case reported here brings up the academic question as to whether the tumor arose from the placental remnants of a pregnancy two years previous or as a teratoid tumor from the ovary. In assuming the former, one must consider the possibility that the remains of a pregnancy within the uterus disappeared. An undestroyed placental fragment transported to the region of the ovary may then have become malignant. Another possibility is that an ectopic pregnancy either in the tube or ovary may have terminated in a similar manner, the passage of clots being the result of the loosening of endometrial decidua. It seems unlikely that a tubal pregnancy could have ruptured or aborted and leave the tubes with no evidence of damage. Although an interval of two years between pregnancy and the appearance of tumor is unusual, a latent period of several years does not argue against the relationship between the two. The disappearance of primary uterine chorioma has been authentically reported[6] and may be applicable to the case reported here. The question as to whether the tumor was related to ovarian pregnancy or originated as a teratoma cannot be answered. The surgical specimen was subsequently reviewed in an effort to find teratomatous tissue other than chorioma, but without success. However, in the reported cases the chorionic elements of a teratoma had frequently so outgrown the other tissue that the latter were hard to find. It appears, therefore, that the case is one of primary chorioma of the ovary.

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Antoine, Tassilo: Pseudomyxoma of the Peritoneum, Ztschr. f. Geburtsh. u. Gynäk. **111:** 37, 1935.

The author presenting seven additional cases seen since 1931 states that pseudomyxoma of the peritoneum may arise from either the appendix or the ovary, and that the condition has been found in both organs simultaneously. The gelatin-like secretion comes from the epithelium and penetrates the connective tissue by a rarefaction of the latter and a compensatory filling of the spaces with the material. The prognosis is bad in advanced cases, the patients dying slowly of cachexia. The treatment consists of radical surgery followed as soon as possible by several courses of deep x-ray therapy of cancer intensity.

Eugene S. Auer.

GRANULOSA CELL TUMOR WITHOUT UTERINE BLEEDING

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WITHIN recent years, granulosa cell tumors have received much attention by gynecologic pathologists. These tumors are, undoubtedly, not as rare as was once thought. Since more has been learned about their physiologic effects, their recognition preoperatively has become more simple; and since their morphologic characteristics are being more carefully studied, the pathologic diagnosis is made more often than formerly.

Since Robert Meyer[8] first emphasized the physiologic effects of these tumors, another cause of menstrual irregularity and postmenopausal bleeding has been discovered. A recent analysis of thirty-six cases by Novak and others, has pointed out characteristic menstrual disturbances which seem to fall in age groups. One interesting point which has a direct bearing on this case report is that cases occurring after the menopause produce periodic or a pseudomenstrual type of bleeding. Details of this have been brought out by another recent study of postmenstrual bleeding in granulosa cell tumors by Novak and Brawner.[10] These disturbances of the cycle are due to the production of theelin by granulosa cells which arise from the ovarian mesenchyme, whether they are of epithelial or connective tissue origin. Biologic hormone studies of the blood and the urine have disclosed that these tumors are capable of secreting the hormone of the granulosa cell. A detailed discourse of the history, pathology and pathologic physiology is not necessary as it has been adequately covered in other papers.

An interesting feature of these tumors is that the majority reported thus far have been unilateral. In Novak's series, which is a rather large series of cases, only two were bilateral in character and only one of these cases presented a second tumor of any appreciable size. Eighty cases studied by Klaften[4] indicated that only five cases were bilateral. One-hundred and one cases studied by Szathmary[5] indicated that only 10 per cent were bilateral.

The reasons for reporting the following case are:

1. Well-developed bilateral ovarian granulosa cell tumors were found.

2. These tumors occurred in a woman three years past her menopause, during which time she had no vaginal bleeding.

A fifty-year-old colored female was admitted to the Gynecological Service at Kings County Hospital on Feb. 11, 1936, complaining of a small lump in an old lower abdominal incisional scar since July, 1935. She claimed it varied in size and at times it became tender. She complained of nausea, vomiting, chills, and fever.

There has been an associated loss of weight (patient could not tell how much) and a dragging pain in the back. There was no vaginal bleeding or discharge. The cardiorespiratory systems were negative.

The patient had never been seriously ill. She was operated upon (on uterus) fourteen years previously. Does not recall type of operation done. Menses $14 \times 28 \times 3$-4 regular. No dysmenorrhea. Venereal disease denied. She had had 8 pregnancies. Menopause, last bleeding three years ago; menopause accompanied by diminishing periods and vasomotor symptoms.

The abdomen was obese. Liver and spleen not felt. In the middle of a lower midline incision a hard mass, measuring $2 \times 1\frac{1}{2}$ inches, was present, tender and

nonreducible. No cough impulse. Appeared to be connected to a large spheroidal mass which occupied the entire lower half of the abdomen. This mass was the size of a five months' pregnancy.

Vaginal examination showed a pelvic mass reaching to the umbilicus, extending three fingerbreadths to the right side and four fingers to the left, hard and tender. Adnexa not felt. The pelvic floor was relaxed. The cervix was underneath the

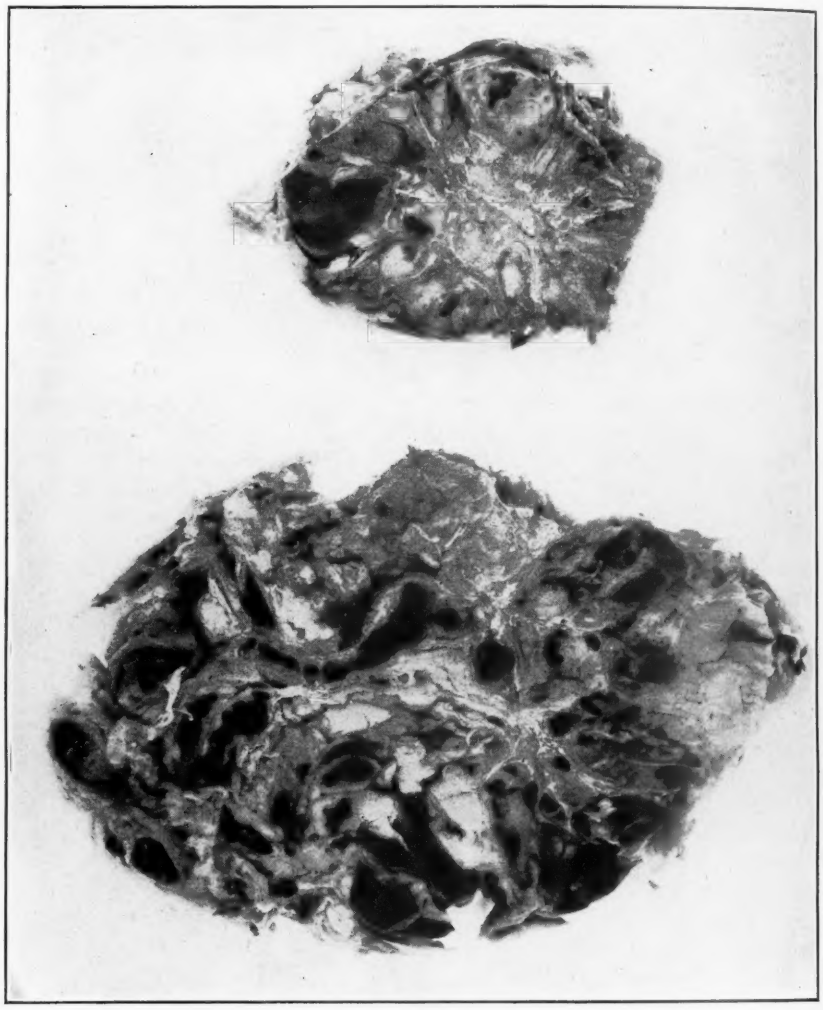


Fig. 1.—Gross specimen of bilateral ovarian tumors.

symphysis and bilaterally lacerated. There was a serous discharge present. Uterus was incorporated in mass described above. A soft mass, the size of a grapefruit, was present in the culdesac, which felt cystic.

A diagnosis of fibromyoma uteri and ovarian cystoma was made.

Operation by Dr. Ogintz.—Excision of old scar and abdomen entered. A small, dark red, friable mass was encountered in the incision. This mass was similar in character to the intraabdominal masses. The uterus was moderately enlarged, and

no fibromyomas were seen. A large mass in the region of the right ovary; a second smaller mass adherent to the sigmoid; a third mass below this, was deeply embedded in the sigmoid. Tubes appeared to be normal.

The first two masses were freed and removed by clamp and suture. The third could not be mobilized for removal. Operative diagnosis: Bilateral carcinoma of the ovaries.

The postoperative course was uneventful. Beginning March 3, 1936 she was given 10 treatments of 200 r. units at a 40 cm. distance. Further treatment was refused by patient. She was discharged March 26, 1936 in an improved condition.

Surgical Pathology.—Gross Specimen: Specimen consisted of two tumors, one measuring 5 by 5 cm.; the other 3 by 2 cm. (Fig. 1). They were ovoid in shape and well encapsulated in a fibrous capsule. Both tumors on cross-section were similar in character. They consisted of islands of grayish, opaque, firm tissue with large irregular hemorrhagic areas. These various areas were encapsulated by strands of light brown and gray fibrous tissue. Isolated areas of light brownish

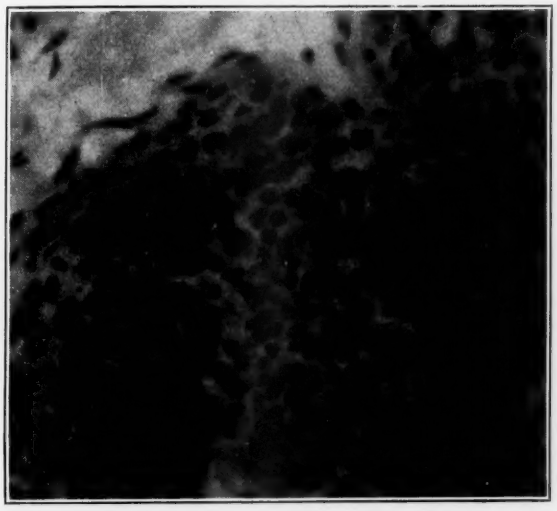


Fig. 2.—Diffuse type. High power.

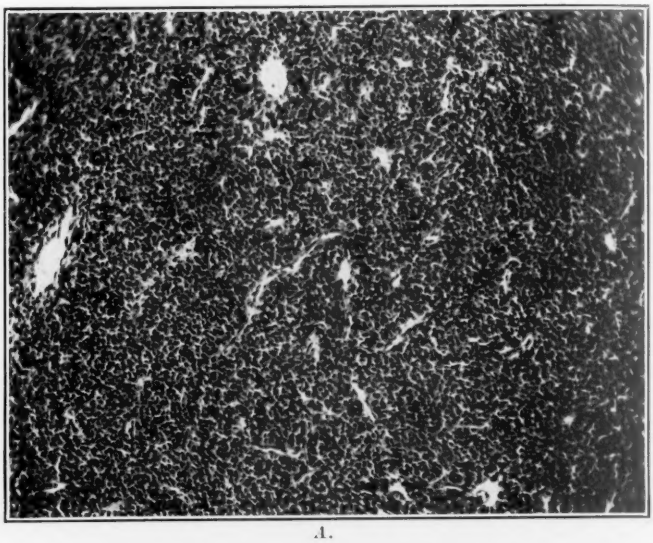
tissue were also noted. Several small cysts filled with clear fluid were also seen in both tumors. Several small pieces of reddish gray tissue, having the same general appearance, Fig. 1, were noted, and taken from the abdominal scar.

Gross Diagnosis: Granulosa cell tumor of both ovaries with metastasis to abdominal scar.

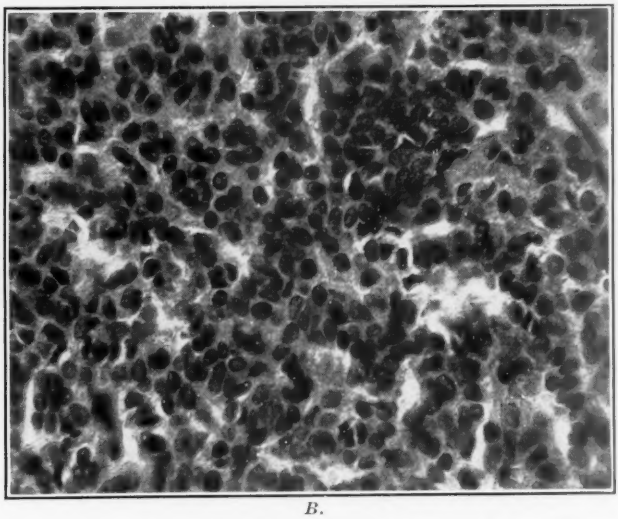
Microscopic Pathology.—Examination of the tumors showed a markedly varying histologic picture. In both tumors evidence of ovarian tissue was noted, in which old corpora albicantia were still present. The newgrowth, for the most part, was of a diffuse type made up of polyhedral cells and irregular columns of cylindrical cells with ovoid and round nuclei, containing a fairly large amount of chromatin, distributed irregularly throughout (Fig. 2). Here and there mitotic figures were seen. The cytoplasm was light pink-staining and granular in character. Definite primordial follicular configurations were noted, with a radial distribution about the lumen (Fig. 3). Other areas showed a mixture of cells growing in a cylindromatous character and, also, small groups of rosette configuration (Fig. 4). The tumor throughout was extremely vascular, and numerous large blood channels were noted

which were lined by apparently granulosa cells. No histologic evidence of corpus luteum was found. The entire tumor was surrounded by a definite fibrous capsule.

Histologic examination of the hemorrhagic fragments showed a diffuse growth of granulosa cells which were closely packed together and did not appear to form any follicular or rosette areas. These fragments were extremely vascular, and there were large areas of hemorrhage throughout.



A.



B.

Fig. 3.—*A*, Rosette type, lower power. *B*, Rosette type, high power.

Diagnosis: (A) Granulosa cell carcinoma of ovary and (B) metastatic granulosa cell carcinoma.

Present Status.—The patient was seen Sept. 26, 1936. Since the operation she stated she felt well and has gained fifteen pounds. Her appetite was good. Her only complaint was occasional urinary frequency and nocturia.

Examination at that time showed a well-nourished patient. Abdominal examination showed no masses. Gynecologic examination disclosed a relaxed perineum. There was evidence of a cystocele. The cervix presented a chronic endocervicitis. The uterus was moderately enlarged. No masses were palpable. Rectal examination was negative. A Friedman test, done at that time, was negative.

DISCUSSION

The reason why this woman did not have menstrual bleeding cannot be definitely explained. No evidence of a corpus luteum variant of the tumor was found either grossly or microscopically, so that production of progestin as a cause for the continued amenorrhea can be discounted. Histologically, the tumor was made up of epithelial granulosa cells, assuming three types of growth: (1) diffuse; (2) immature follicles and (3) cylindrical. Although no biologic assays were done for folliculin, judging histologically from the type of cell, the folliculin levels must have been high.

The more recent explanation of menstrual bleeding of a folliculin level sufficient to inhibit the anterior pituitary, thereby producing depressing ovarian activity, is also

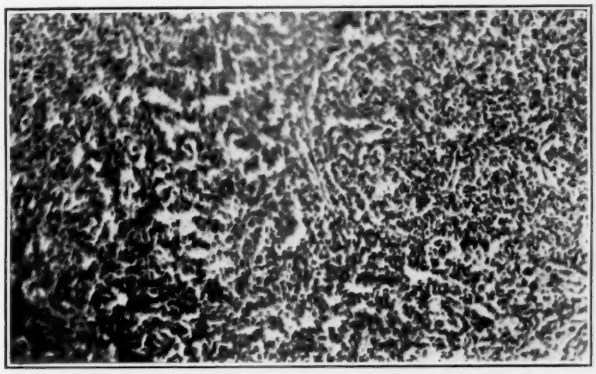


Fig. 4.—Cylindrical type, low power.

insufficient to explain the amenorrhea, because the extent of the tumor involvement and histologic character, as stated above, must have produced levels of folliculin capable of pituitary inhibition. The enlarged uterus in the gross absence of fibromyomas is indirect evidence that folliculin was produced and was active on the uterus. Unfortunately, a curettage was not done, which might have yielded further evidence of follicular activity upon the uterus.

Two cases of granulosa cell tumor with amenorrhea have been reported in the literature. One case, studied by Benda and Krans,[2] was of a patient thirty-eight years of age with an amenorrhea of two years' duration. They were under the impression that this tumor was producing the lutein hormone because, histologically, the tumor was made up predominantly of lipoid-laden cells with characteristics of lutein cells. The menses returned after operation. The other case was studied by Szathmary.[3] This occurred in a woman sixty-three years of age, in which they found a tremendously hypertrophied uterus. They felt that the reason for her amenorrhea was because of a greatly hypertrophied endometrium with marked necrosis, producing a disturbed circulation.

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PERIPHERAL GANGRENE FOLLOWING PREGNANCY

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THE occurrence of gangrene of an extremity following pregnancy is so unusual that a review of the literature up to and including 1934 revealed only 102 cases. The largest individual contribution was that of O. Schmidt[1] (1921) who reported 3 cases. Since we have had 3 such cases within a period of five years, I believe they are worthy of being recorded.

Case 1.—J. D., aged thirty-seven, gravida vii, para v. Previous pregnancies terminated in normal deliveries with the exception of two spontaneous uncomplicated abortions at three and two and one-half months, respectively. Last pregnancy three years previous to present admission.

Patient attended the antenatal clinic where her course was uneventful. During the last month of pregnancy she developed painless swelling of the left lower extremity.

On admission, irregular uterine contractions were present. The uterus was enlarged to the size of a full-term pregnancy, and an average-sized fetus was found presenting in the L.O.A. position. Temperature and pulse were normal. Blood pressure 116/78 and urinalysis negative.

The only other physical finding of note was marked swelling of the left lower extremity with tenderness along the course of the saphenous vein and beneath the left Poupart's ligament, thought to be due to venous thrombosis.

She delivered spontaneously a normal full-term fetus after a six-hour labor. For the first seven days postpartum her course was satisfactory. The tenderness and swelling in the left leg improved gradually and the pulse and temperature remained within normal limits. On the second day postpartum, one gynergin tablet (ergotamine tartrate gr. 0.008) was given every four hours, the indication being profuse lochia. This medication was continued until the morning of the eighth day postpartum, a total of 32 doses in all.

On the eighth day she began to complain of pain in the left foot and it was found that the latter was cold, cyanotic and slightly tender. At this time her pulse rose to 120 and temperature to 100° F.

A diagnosis of arterial thrombosis with impending gangrene was made and conservative treatment was instituted. Temperature remained in the neighborhood of 102° with gradual return to normal in ten days. Dry gangrene involving the entire left foot was present with the line of demarcation appearing just above the ankle. Three weeks after onset of gangrene a midleg amputation was performed with an uneventful recovery.

Gross pathologic examination revealed thrombosis of all large veins and arteries above the gangrenous area. Microscopic examination of veins revealed an extensive thrombophlebitis with periphlebitis.

On first analysis of the above case, it would appear that there is a very definite causal relationship between the administration of 32 doses of gynergin and the onset of the thrombosis. In 1930 P. Oginz[2] reported a case of puerperal gangrene following 42 doses of gynergin; however, his case had an associated severe puerperal sepsis in itself, a possible cause for the gangrene. E. J. McGrath[3] reported the repeated production of gangrene in white rats by the administration of large doses of gynergin, the gangrene being due to intimal changes in the blood vessels with secondary thrombosis. Ergot similar to adrenalin stimulates the myoneural junctions of the sympathetic system, resulting in arterial contraction, its effect being less powerful but more enduring than adrenalin. Peripheral gangrene may result from the prolonged contraction of the capillaries or from thrombosis of larger vessels secondary to toxic intimal changes in their walls.

In the above case we have the presence of a definite thrombophlebitis in the limb affected by subsequent thrombosis for five weeks prior to the administration of the gynergin. The gangrene was localized to one extremity (which would be unusual for ergot poisoning) and the pulsations in the right extremity remained normal at all times. Also, the patient at no time evidenced any of the symptoms of the initial stage of ergot intoxication.

The findings of most significance, however, were the microscopic sections of veins removed from the upper portion of the amputated extremity. Many of these veins lying in close proximity to the larger arteries were filled with infected thrombi, with marked phlebitis and periphlebitis as evidenced by extensive polymorphonuclear infiltration.

The extension of the infection to the arterial walls by direct contiguity or via the vasa vasorum with secondary thrombosis would seem more plausible in view of the above, than to presuppose an atypical type of ergot poisoning plus an associated extensive thrombophlebitis.

CASE 2.—F. S., aged thirty-five, gravida iii, para ii. The first pregnancy terminated at seven and one-half months with the spontaneous delivery of a macerated fetus; etiology not definitely stated but thought to be due to a toxemia. Second pregnancy resulted in an uncomplicated spontaneous abortion during the third month.

Patient was admitted to hospital during the seventh month of her third pregnancy with a history of vomiting, frequent headaches, and edema of the ankles and face of one week's duration. She had had four generalized convulsions just previous to hospitalization. Examination revealed patient to be in a semicomatose condition; fundus was enlarged to the size of seven and one-half months' pregnancy and there was moderate edema of both lower extremities. Blood pressure was 145/100 and the urine contained a marked trace of albumin with many hyaline and granular casts. Shortly after admission she had another generalized convulsion.

A modified type of Stroganoff treatment was instituted. She remained in a semicomatose condition for twenty-four hours following which uterine contractions began. After a three-hour uneventful labor a macerated stillborn infant was delivered spontaneously. She improved rapidly following delivery and for seven days postpartum had no complaints. Temperature and pulse remained within normal limits. Blood pressure dropped to 130/80 and urine continued to show a trace of albumin. On the morning of the eighth day postpartum she began to complain of pain in the left lower extremity. This was relieved by ⅙ gr. of morphine. Examination revealed no swelling or tenderness. She continued to have slight pain in the affected leg for the following three days. Temperature

and pulse remained normal. In view of marked improvement, she was allowed out of bed on the afternoon of the twelfth day postpartum, four days following the onset of pain in the lower extremity.

Shortly after leaving bed the patient was again seized with a severe pain in the left leg, again requiring morphine for relief. Pain continued for thirty-six hours following which it was noted that the entire left extremity was discolored from the knee to the toes; the same area was cold and cyanotic. The dorsalis pedis and popliteal arteries were not palpable. Thrombosis of the femoral artery was diagnosed, and an immediate arteriotomy was decided upon.

At operation the left femoral artery was exposed in the region of Hunter's canal. The vessel walls were found thickened and rigid with no pulsations present. The artery was incised and a thrombus removed, following which blood spurted from the proximal end of the vessel. The popliteal artery was then exposed through an incision in the popliteal region. On incision this vessel was found to contain a well-organized thrombus which was removed by injecting saline through the upper incision and allowing it to flow through the popliteal incision. The arteries were closed with paraffinized black silk.

The following day her condition showed no improvement; cyanosis and coldness persisting in the extremity. During the following five days the line of demarcation of dry gangrene gradually appeared at the junction of the mid and lower thirds of the leg. A midleg amputation was performed six days following the arteriotomy. Patient remained well for three weeks following the amputation when she began to complain of pain and numbness in the right foot. Examination revealed slight swelling but no cyanosis. The right popliteal and dorsalis pedis arteries were not palpable. Impression was thrombosis of the right popliteal artery. Elevation of the leg together with dry heat and diathermy treatments was immediately instituted and continued for four days. The pain gradually subsided and she was discharged from the hospital two weeks later in good condition.

Pathologic examination of the amputated extremity revealed an extensive phlebo- and arteriosclerosis.

Previous to the onset of gangrene in this patient we could find no evidence of infection to account for its occurrence. In casting about for some other possible explanation for the thrombosis we were led to wonder what rôle, if any, the occurrence of eclampsia might have had. In reviewing the previous reports, it was found that puerperal gangrene had been preceded by eclampsia in 6 of the cases.

Blackman[4] reports a case of severe eclampsia during labor in an eighteen-year-old primipara followed by gangrene of both extremities on the third day postpartum. At autopsy the abdominal aorta was found thrombosed 2 inches above its bifurcation.

Lugeol's[5] case was one of severe intrapartum eclampsia followed by phlegmasia alba dolens of the right lower extremity on the tenth day postpartum. Four days later gangrene appeared, resulting in amputation two months later. Examination of the arteries in the amputated stump revealed thrombosis with endarteritic changes.

In Tate's[6] report the gangrene involved both lower extremities and followed a severe attack of eclampsia. Death occurred twenty-three days later.

Schuhl's[7] patient was a thirty-eight-year-old para vii who had 6 eclamptic seizures during labor. On the sixth day postpartum the left extremity became gangrenous. Death followed twelve days later with no autopsy.

O. Gutbrod[8] reported 2 cases. The first was a twenty-two-year-old primipara who had 17 convulsions during labor. On the second day postpartum numerous areas of gangrene appeared on all extremities; the right foot was amputated two months later with recovery.

His second case occurred in a forty-seven-year-old para v who had numerous convulsions before and after delivery. She was out of bed on the tenth day; several

hours later symptoms of arterial thrombosis in the left leg occurred. Gangrene resulted, with extensive superficial sloughing, followed by recovery.

In at least 6 more of the reported cases of peripheral gangrene, the presence of a pregnancy toxemia is strongly to be suspected. The frequent association of such a rare condition with eclampsia surely must be explained on some basis other than coincidence.

Dienst[9] showed that the blood of eclamptic patients contained an excess of fibrin and fibrinogin, and Fahraens demonstrated the increased precipitation rate of the red blood cells; also an increase in the polymorphonuclear leucocytes and platelets has been demonstrated. We have ample evidence of the coagulation time being increased in the difficulties experienced in doing phlebotomies on these patients. Any or all of the above could be contributing factors in the formation of a thrombus, but they do not explain the production of a lesion of the intimal wall of the vessel so essential to the production of any thrombosis.

COMMENT

We have considerable evidence to show that the etiologic factor usually referred to as a toxin responsible for eclampsia is a specific circulatory poison, the hypertension which is such a constant finding being one of the manifestations of this intoxication. We know also that it has a direct effect upon the capillary walls, increasing their permeability, and Hinselmann[10] has demonstrated the presence of an angiospasm in this condition. It is only a short step further to presuppose the occurrence of a toxic degeneration of the intima similar to that which occasionally occurs in typhoid, scarlet fever, and other severe intoxications, which plus the above mentioned blood changes would easily account for the thrombosis.

An interesting aspect of this case was the finding of all the symptoms of thrombosis, except gangrene, on the eighth day postpartum followed by gradual improvement until she was allowed out of bed on the twelfth day postpartum. At that time she had a recurrence of all the thrombotic symptoms, this time followed by the appearance of gangrene. Apparently thrombosis occurred during the first attack, but the collateral circulation was sufficient to prevent gangrene. However, allowing the patient to leave her bed so soon after the first attack resulted in an extension of the thrombosis with gangrene resulting. This assumption is borne out by the findings at operation. A well-organized thrombus was found in the popliteal artery with a more recent thrombus in the femoral artery. The occurrence of pain in the right leg with loss of popliteal pulsation three weeks following amputation of the left extremity also was undoubtedly due to thrombosis. Fortunately the collateral circulation was again sufficient to prevent gangrene.

In these patients the extent of the gangrene can never be predicted from the site of the thrombosis: closure of a large vessel in the thigh may only result in gangrene of a portion of the toe, whereas closure of a much smaller vessel at a lower level in a different individual may implicate the entire foot. The difference depends largely upon the efficiency of the collateral circulation and the rapidity of its development.

The performance of arteriotomy on this patient may be open to considerable criticism. To attempt this operation thirty-six hours after closure of the vessel alone will result in 100 per cent failures. Also the operation is only applicable to those cases where the intimal lining remains intact, i.e., in cases of embolism; and even in those cases if operation is not resorted to promptly, degenerative intimal changes will occur.

Arteriotomy in those cases of thrombosis, such as above described, will certainly not be successful due to the already existing lesion in the vessel wall which will cause a recurrence of the thrombosis following the arteriotomy.

Where there is reasonable doubt as to the etiologic factor, of course, the arteriotomy should be attempted, providing the diagnosis is made promptly.

The differential diagnosis between arterial thrombosis and embolism may be a difficult one. Emphasis is properly laid in the former upon the more gradual appearance of symptoms and in the latter upon the sudden onset and detection of some source for embolism especially cardiac disease.

CASE 3.—F. B., aged nineteen years, gravida iv, para ii. First two pregnancies terminated in normal spontaneous deliveries two and four years before admission. She had spontaneous uncomplicated abortion one year previously.

Last menstrual period had been three months previous to hospitalization. Chief complaint was vaginal bleeding of two days' duration associated with abdominal cramps. On admission bleeding was profuse; the uterus was enlarged to the size of a three months' pregnancy; and a 9 cm. fetus was found in the vaginal canal. Protruding from the cervical os was a piece of placental tissue which was removed. Bleeding was controlled with a vaginal packing. Twelve hours later her temperature rose to 102° F., so vaginal pack was removed. For the following five days temperature fluctuated between 100° to 104° F. associated with frequent chills. Only physical findings of note were moderate lower abdominal tenderness and a foul vaginal discharge. Examination of heart and lungs revealed no pathology.

Diagnosis, endometritis with thrombophlebitis of the placental site.

On the sixth day her temperature dropped to normal and remained there until discharge seven days later. On the seventh day following the abortion, she had slight swelling of the left ankle associated with tenderness. The day following discharge from the hospital she began to complain of pain in the left lower extremity in the region of the ankle and was re-admitted to the hospital. At this time the left foot and ankle were found swollen, reddened, and tender. Temperature was 103° F. and the white blood cells 30,000 with 84 per cent polymorphonuclears. The dorsalis pedis pulsations were identified.

It was now believed that the patient had an acute osteomyelitis secondary to a pelvic thrombophlebitis. Pain and tenderness persisted in the left foot for three days with no extension. X-ray revealed no pathology. The leg was elevated and wet dressings applied. On the morning of the fourth day following the onset of pain it was observed that the left foot and ankle were cold and cyanotic. The correct diagnosis was now apparent, namely, thrombosis, and amputation of the extremity was advised. The patient was transferred to another hospital where a midleg amputation was performed the following day, followed by an uneventful recovery. Unfortunately no pathologic examination of the amputated extremity was performed.

The presence of fever, pain, tenderness, and swelling in the region of the ankle with a palpable dorsalis pedis for three days previous to the onset of gangrene obviously rules out the possibility of embolism in this patient. The occurrence of arterial thrombosis in a patient previously suspected of having a phlebitis should point immediately to the correct diagnosis, namely, arteritis.

I wish to express my thanks to Dr. Charles A. Gordon, not only for permission to report the above cases but also for his many suggestions and kind assistance.

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402 OCEAN AVENUE

SICKLE CELL ANEMIA WITH PREGNANCY

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SICKLE cell anemia has figured largely in medical literature since Herrick[1] described the condition in 1910, and there have been many cases reported. Anderson and Ware,[2, 3] four years ago, published an excellent summary of the disease, presenting the cases observed at Grady Hospital up to that time. Sickle cell anemia with pregnancy is rare. Lash[4] reported such a case in 1934, finding only two earlier ones in the literature. The following case seems to be the fourth.

REPORT OF CASE

A negro woman, aged twenty-five years, was admitted to the Obstetric Service of the Emory University Division of Grady Hospital on Nov. 13, 1935. Her last menstrual period had begun on Aug. 13, 1935.

History.—As a child the patient had been unable to carry on normal activity because of fatigue and shortness of breath on moderate exertion. Heart disease had first been diagnosed when she was ten. Two years later pain in both ankles had been severe enough to keep her in bed a week, although there was no swelling or fever. With limited activity she then became free of all symptoms until her marriage in 1931. During the next four years three pregnancies had terminated in abortions at four to seven months, the last of these occurring during an illness, said to have been pneumonia.

On Aug. 26, 1935, she was admitted to the medical outpatient department. A diagnosis of rheumatic heart disease was made and restriction of activity was advised. The patient returned on Oct. 19, 1935, complaining of shortness of breath and palpitation. Hemoglobin at this time was 40 per cent (Tallqvist); red cells numbered 1,590,000; white cells 20,000. Marked anisocytosis and poikilocytosis were observed. She was referred to the antepartum clinic because of amenorrhea for two months. There was no history of leg ulcers or abdominal pain. The family history was apparently irrelevant.

Examination.—The patient was well developed but undernourished. Her face appeared somewhat puffy. The conjunctiva and mucous membranes were extremely pale. Ophthalmoscopic examination was negative. Breast secretion was present. The left border of cardiac dullness was 11 cm. from the midsternal line in the fifth intercostal space. The right border of dullness was 4 cm. out in the fourth. No thrill was present. There was a diastolic shock at the base. The first and second sounds at the apex were clear and of good quality. There was a soft, blowing, systolic murmur at the apex transmitted to the base. The pulmonic second sound was accentuated. The radial pulses were equal, synchronous, and of good volume. The fundus uteri was palpable 5 cm. above the symphysis pubis. The liver and spleen were not felt. The cervix was softened. Goodell's and Hegar's signs were present. The uterus was symmetrically enlarged and softened. The extremities presented no scars or ulcers.

Laboratory Findings.—(Nov. 13, 1935.) Hemoglobin 45 per cent (Tallqvist); R.B.C. 1,500,000; leucocytes 36,800; neutrophiles 80 per cent; lymphocytes 20 per

cent. Smear revealed anisocytosis, poikilocytosis, many sickle cells, and an occasional normoblast. Moist preparation for sickling revealed approximately 50 per cent sickle cells. There was an increased resistance of red cells to hypotonic solutions. Icterus index 22. Serum bilirubin 1.5 mg. per 100 c.c. The Wassermann reaction was negative. Blood chemistry was within normal limits. Serum protein was 6.25 gm. per 100 c.c. with 2.60 gm. of albumin. Urinalysis: sp. gr. 1.014, albumin 3-plus, occasional pus and blood cells. Concentration and dilution tests showed maximum range of sp. gr. from 1.002 to 1.012. Phenolsulphonephthalein test (intravenous administration), 45 per cent excretion in two hours. Gastric analysis showed no free hydrochloric acid after Ewald test meal. Stool examinations were repeatedly negative.

Roentgenologic Studies.—Teleoroentgenogram of the heart showed definite cardiac enlargement. Total transverse diameter of heart was 15.2 cm.; internal diameter

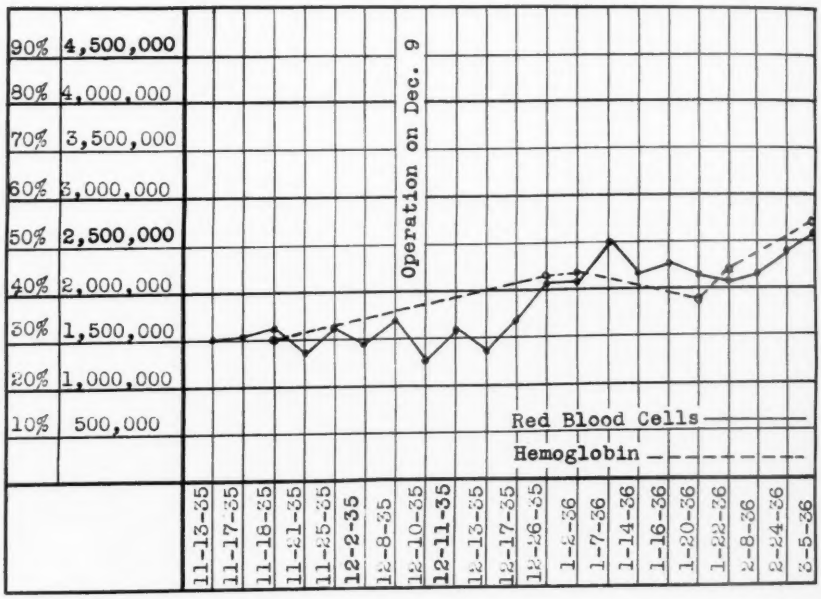

Fig. 1.—Graph of red blood counts and hemoglobin determinations (Sahli) throughout the period of observation.

of thorax was 23.7 cm. Films of the left hand and foot revealed mottled areas of decreased density in the ends of the metacarpals, the metatarsals and the phalanges. The midportions of the shafts of all bones appeared normal. A film of the skull showed mottled areas of decreased density throughout the vault, but chiefly in the parietal and frontal regions.

Course.—The patient was put to bed on a high protein, high caloric diet. Iron and ammonium citrate was given by mouth, and one ampule of liver extract was given intramuscularly daily. Although the patient's blood belongs in Group IV (Moss), on cross-matching 20 potential donors, no compatible one could be found. It was therefore impossible to give her a transfusion. The red count remained between 1,250,000 and 1,700,000 (see graph of blood counts). Termination of pregnancy was thought necessary, and hysterotomy with sterilization was selected as the method of choice. Operation was performed on Dec. 9, 1935. The postoperative

course was uneventful. She was kept in the hospital for observation until Jan. 25, 1936, and when dismissed she was greatly improved. The patient was readmitted

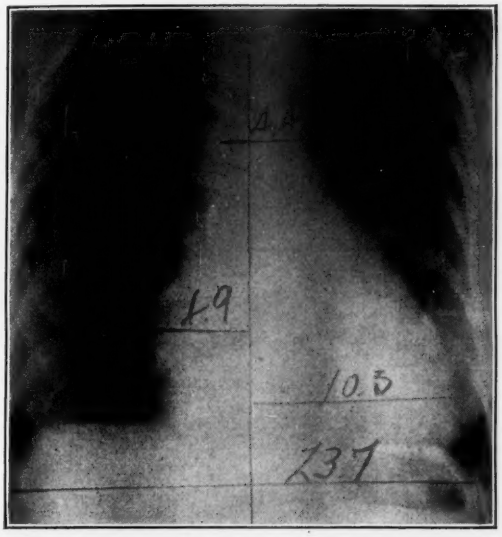

Fig. 2.—Photograph of teleoroentgenogram which shows definite cardiac hypertrophy, a typical feature of sickle cell anemia.

Fig. 3.—X-ray of skull showing mottled areas of decreased density throughout the vault.

for further study on Feb. 12, 1936. The red count at this time was 2,400,000 with hemoglobin of 40 per cent (Sahli). The phenolsulphonephthalein test revealed 85 per cent excretion in two hours. The concentration and dilution tests remained

essentially the same. Serum albumin was 3.35 gm. per 100 c.c. There was a soft, blowing, systolic murmur at the pulmonic area. Persistent albuminuria, Grade 2 to 3, was present throughout the period of observation.

COMMENT

This case exemplifies the rather common error of mistaking sickle cell anemia for rheumatic heart disease. In addition it suggests an interesting line of supposition. Yater and Mollari[5] mention the fact that two pregnancies in their patient had

Fig. 4.—Film of left hand which shows decreased density in the ends of the metacarpals and the phalanges.

terminated as abortions. Our patient had had three abortions and no full-term pregnancies. Sickle cell anemia as an etiological agent in habitual abortions is suggested.

It is well recognized that sickle cell anemia exists in both an active and a latent state, but the causes of exacerbations and remissions are not known. Since there was a definite remission following termination of pregnancy in this patient, the possibility exists that pregnancy was causing an exacerbation. Since pregnancy was not allowed to continue to a spontaneous termination, further cases must be studied before a conclusion can be reached.

The bone changes as shown by x-ray have been mentioned often.[6-8] These are exemplified in Figs. 2 to 4.

The question arises as to the presence and effect of renal disease in this patient. With no history of previous acute nephritis, a normal blood pressure throughout the period of observation, and improvement of phenolsulphonephthalein excretion with remission of the anemia, the probability is that the evidence of kidney disease is on the basis of the anemia. Nephrosis is to be considered.

SUMMARY

1. A case of sickle cell anemia complicated by pregnancy is presented.

2. Sickle cell anemia as a possible cause of abortions is suggested.

3. Pregnancy as a factor in exacerbations is considered.

4. This case is published with the hope that further cases will be studied to confirm or disprove the suppositions presented.

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ACTINOMYCOTIC GRANULES IN A RETENTION CYST OF THE CERVIX UTERI

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ACTINOMYCOSIS of the internal female sex organs is being reported with increasing frequency, and in the majority of the cases the lesions are found to affect the ovaries, fallopian tubes, and parametria. Most of the authors who have reviewed the literature or have described personal observations emphasize the great resistance of the uterus to the infection, stating that if the uterus does become involved it is due to the extension of the process from the parametrium (Nürnberger,[1] Daniel and Mavrodin,[2] Cornell,[3] and others). The actinomycosis of the ovaries, tubes, and parametria is usually secondary to an infection of the intestine, particularly of the cecum or appendix. From the intestine the infection spreads to the ovaries and parametrian tissue either retroperitoneally or intraperitoneally along pericecal or periappendiceal adhesions. Blasek[4] has pointed out that the actinomycotic infection may progress while the primary lesion at the point of entrance in the intestine heals. It requires then a very careful histologic examination in order to detect the residues of the initial lesion in the intestine. Daniel and Mavrodin[2] refer to the external genitalia as a possible port of entrance of the infection.

From time to time, however, cases are described which suggest that the ray fungus may directly infect the internal female genitalia, the primary lesion being located in the uterus. With regard to this primary actinomycosis of the uterus, an observation is of interest which I have recently made and which indicates that the infection may remain dormant.

CASE REPORT

History.—With the specimen the following data have been submitted to the laboratory: The patient is an American born, Jewish woman, aged thirty-four years. She has one child which is sixteen years of age. Thirteen and three years ago a cervical repair had been performed. She complained of dull pain in the back and lower abdomen which was gradually getting worse and was most marked during menstruation. The physical examination revealed a moderate tenderness in the lower abdomen, a slight enlargement of the uterus, and an induration and scarring of the vaginal portion of the cervix. A vaginal hysterectomy had been performed, from which the patient was recovering satisfactorily.

Gross Examination of Specimen.—The uterus and the left ovary were submitted for examination. The uterus measured 9 by 5 by 4 cm., its wall was 20 mm. thick and on the posterior surface of the fundus there was a circumscribed, subserous,

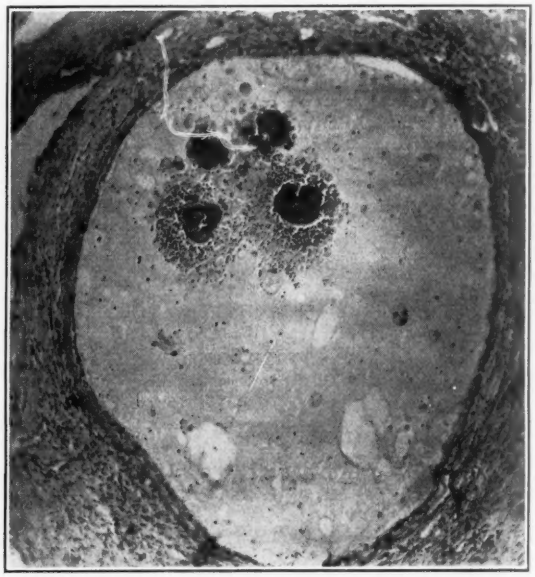

Fig. 1.—Four ray fungi in a small retention cyst of the cervix uteri. Note the accumulation of exudative cells about the fungi. Magnification ×100.

grayish white node 20 mm. in diameter. The inner lining of the uterus was smooth and light yellow gray, and in the vaginal portion of the cervix several shallow, irregular depressions were found which radiated from the external mouth and alternated with tiny cysts which were filled by a mucoid material. The cervical canal was lined by an intact and pale mucosa. The ovary which measured 45 by 40 by 22 mm. contained a hemorrhagic corpus luteum and a small, thin-walled serous cyst.

Microscopic Examination.—The nodule of the fundus of the uterus proved to be a simple fibromyoma. The endometrium showed the changes of premenstrual hyperplasia. The cervix revealed a slight hyperplasia of the glands with cystic dilatation of some of the glands and a moderate periglandular fibrosis. In the vaginal portion of the cervix, closely adjacent to the surface epithelium and separated from it by a thin layer of connective tissue, there was a small cyst which was surrounded by accumulations of round cells and which was lined by an intact, low cylindrical epithelium with basal nuclei. The cyst was filled by a vacuolated, mucoid material

which contained large, multinucleated cells with vacuolated cytoplasm and polymorphonuclear leucocytes. The cyst also contained four roundish bodies which measured 100 microns in diameter and were surrounded by accumulations of leucocytes and multinuclear cells (Fig. 1). These bodies consisted of a homogeneous center and a peripheral zone of regular, club-shaped protrusions which had a great

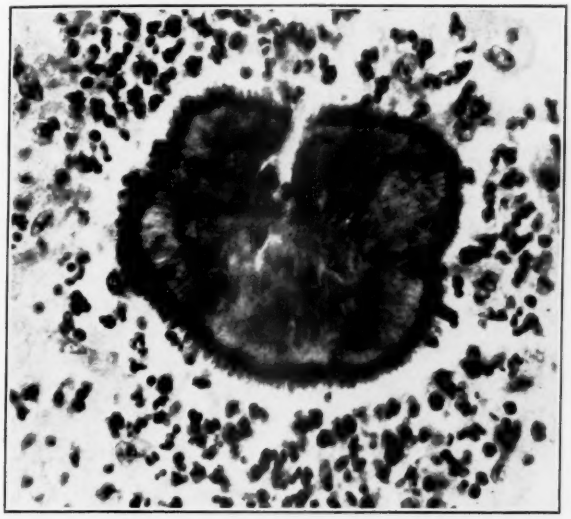

Fig. 2.—Ray fungus surrounded by pus cells and macrophages. Magnification ×600.

Fig. 3.—Phagocytosis of the club-shaped endings of the mycelia by multinucleated macrophages and disintegration of the mycelia in the cytoplasm of these cells. Magnification ×1000.

affinity to the acid stains (Fig. 2). Some of the protrusions were enclosed in the large multinuclear cells and showed evidence of disintegration (Fig. 3). In sections stained after Gram-Weigert the central portion showed branched and segmented filaments which were thicker than those commonly seen in actinomycotic granules. The filaments contained tiny, spherical bodies which stained deeper than the surrounding structures. There were small crevices in the center of the bodies in which flattened leucocytes were located.

When the ray fungi were discovered in the subepithelial cyst, serial sections were made from the remaining portion of the paraffin block and numerous sections were taken from the cervix, but no other bodies could be detected.

DISCUSSION

The identification of the granules in the small cyst of the cervix as actinomyces rests entirely upon their morphology since no cultures were made from the content of the cyst. The structure of these granules is so typical that they undoubtedly belong to one of the varieties of actinomyces which, in living tissue, form club-shaped thickenings of the free ends of the mycelia. In all the cases of actinomycosis of the uterus described in the literature the diagnosis was based upon the demonstration of the characteristic bodies either in sections or smears.

A structure which can be confused with actinomyces is the actinophytic evolution form of certain bacteria, notably staphylococci (Botryomyces). In chronic suppurative osteomyelitis the staphylococci form occasionally compact clumps which are surrounded by a homogeneous shell. Berger, Vallée and Vézina[5] have recently described a staphylococcic actinophytosis of the vulva. It is, however, only under low power magnification that the staphylococci granules can be mistaken for actinomyces, since the finer morphology is different, the former being composed of cocci, the latter of branched filaments.

How does the actinomyces gain entrance into the uterus? In order to infect the actinomyces must find a break in the continuity of the tissues. The case of Giordano which is often quoted in the literature concerns a woman, aged sixty-four years, who used to feed her chickens with grain. Her uterus was prolapsed and on the posterior lip of the vaginal portion of the cervix there was a small, indurated area. The external uterine orifice was half open and the cervical canal contained thick cloudy fluid in which the characteristic sulphur bodies were suspended. Vaginal hysterectomy was followed by complete recovery. Giordano suggests that the spores of the fungus were present in the grain used for feeding the chickens and that they might have settled on the eroded and prolapsed cervix of the uterus. This is the only case in which the patient had anything to do with grain. In two instances the actinomycosis of the uterus followed an instrumental abortion (Haselhorst[7] and Junghans[8]). In Haselhorst's case a fistulous tract extended from near the internal uterine orifice into the left parametrium which was the site of a sclerosing, suppurative inflammation involving the left tube, the sacral bone and the fifth lumbar vertebra. Junghans' case showed an instrumental perforation in the anterior fornix of the vagina from which the actinomycotic infection seemed to have taken its origin. In the cases described by Barth[9] and Tietze,[10] the infection was traced to ulcerative lesions caused by intrauterine, contraceptive pessaries. In the cases of Mitra[11] and Christeller[12] the mode of infection is obscure.

In the case which I have described it is possible that the fungus may have been inoculated into the cervix during the repair performed three years previously. The spores of actinomyces are much more widely distributed than formerly assumed. The fungus is either of low virulence or the resistance of the tissues is strong enough to prevent the spreading of the infection. In favor of the later explanation is the finding of regressive changes of the mycelia and especially the phagocytosis of the

mycelia by multinucleated macrophages in the cytoplasm of which they disintegrate. That the granules did produce some irritation is shown by the accumulation of pus cells and macrophages about the granules and the round cell infiltrations which are confined to the vicinity of the cyst which contains the granules. Thus the case may be considered as morphologic confirmation of the high resistance of the uterus to infections with the ray fungus.

SUMMARY

In a small retention cyst of the uterine cervix typical actinomycotic granules were found incidentally. The infection was well localized and did not show any evidences of progression. These findings seem to illustrate the high resistance of the uterus to the infection with the ray fungus.

The literature on primary actinomycosis of the uterus is discussed briefly.

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LATE PREGNANCY COMPLICATED BY INTESTINAL OBSTRUCTION DUE TO AN OPENING IN THE MESENTERY IN A YOUNG PRIMIPARA

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INTESTINAL obstruction due to a loop of bowel becoming strangulated in a congenital opening of the mesentery is rare. The following is a report of such a case occurring in a young primipara seven months pregnant, in which it was quite difficult to differentiate the pain due to possible bowel obstruction from that due to premature uterine contractions.

The patient, a white primipara, aged twenty-one, seven months pregnant, entered the City Hospital of Akron at midnight, April 19, 1936. Her chief complaints on admission were severe cramplike pains over the entire abdomen and marked nausea with vomiting. She had been ill for about ten hours. The onset had been rather abrupt with increasing severity of the symptoms. She had had no bowel movements subsequent to the onset but she did recall passing some flatus. About four to six hours after the onset of the illness she began to feel quite distended.

There was no history of surgical operation in the past and no other essential history was elicited. A white blood count showed 20,000 leucocytes with 92 per cent polymorphonuclears. The urine showed 2-plus sugar with 3-plus acetone bodies and many pus cells.

Physical Examination.—The patient was a well-nourished young woman, lying in bed and appearing quite ill. Her respirations were increased and she seemed to have attacks of cramplike pain in the abdomen, coming on intermittently about every three to four minutes.

On admission the temperature was 100.8° F. by mouth, the pulse rate 106, and respirations 34. She was rational and not excited, she answered questions readily and intelligently.

There was a soft, blowing systolic murmur which was best heard at the apex. The heart rate and rhythm were regular, and there was no apparent cardiac enlargement. The blood pressure was 136/70.

The abdomen was moderately distended. It was believed that peristaltic activity could be seen in the upper left quadrant. There was some left-sided tenderness and also some rigidity of the left abdominal muscles. The degree of rigidity was difficult to determine. The uterus was enlarged to the size of a normal seven months' pregnancy, but the fundus was high and lying definitely to the right in the upper abdomen. There was also evidence of intestinal distention. No peristaltic action was audible on auscultation.

On bimanual examination the head of the child was found to be at the entrance of the birth canal but was not engaged.

Preoperative Treatment and Course.—A presumptive diagnosis of intestinal obstruction had been made by Dr. C. H. Bair, the attending physician, and the

Fig. 1.—Photograph by Dr. E. L. Saylor showing dilatation of sigmoid colon.

history, along with the evidence found on physical examination, strongly supported this possibility, but it was difficult to determine the source of the intermittent pains as the fever suggested some type of infection with premature labor pains. Accordingly, it was decided best to treat the patient conservatively with continuous duodenal drainage by the use of the Wangensteen apparatus.

A soapsuds enema given one hour after admission returned clear, and a moderate amount of flatus was expelled. Despite the fact that the patient complained of severe pain, opiates and other sedatives were withheld. Water was given freely by mouth and removed through the drainage tube.

Eight hours later the clinical condition was unimproved, and it was evident the drainage apparatus was not relieving the distention. In fact, the abdomen was definitely more rounded and tense. The temperature had risen to 102.6° F. and the pulse rate to 118. One thousand cubic centimeters of normal saline were given intravenously. A blood sugar reading revealed 123 mg. per 100 c.c. After a second consultation, it was decided that immediate operation was advisable.

Operative Procedure and Findings.—The operation was carried out twelve hours after admission under nitrous oxide, oxygen, and ether. A left paramedian incision was made from 5 cm. above the umbilicus to a point near the pubic symphysis. Up-

on opening the peritoneum quite a large amount of cloudy, seropurulent fluid was found which was removed by suction. The enlarged, gravid uterus and the greatly distended loops of bowel made exploration exceedingly difficult.

A circular opening with rigid walls, which easily admitted two fingers, was found in the mesocolon of the sigmoid near its midportion, and a loop of redundant sigmoid had passed through the aperture, becoming firmly incarcerated and obstructed. All of the colon proximal to the obstruction was distended and filled with gas and large soft masses of fecal material. Two loops of bowel directly involved at the site of the obstruction were dilated to about six inches in diameter. This extreme colonic distention pressed upward against the diaphragm forcibly and extended from that region downward into the culdesac space posterior to the uterus. The enlarged uterine fundus was pushed far to the right and all of the available abdominal space was occupied by the viscera under the utmost pressure.

A rectal tube was inserted during the operation in an effort to collapse the affected sigmoid but without success. A trocar was then thrust through the distended colon and the compressed gas and fluid contents were removed with resulting collapse of the bowel. Contamination was controlled by a purse-string suture at the site of the puncture and the bowel carefully closed with intestinal catgut. The obstructed portion of the bowel was freed from the hole in the mesentery and with the exception of one questionable area on the antimesenteric aspect of the loop, which had been strangulated, the bowel appeared in good condition. Because of the generally unfavorable condition of the patient, nothing further was done. The incision was closed without drainage.

Postoperative Treatment and Progress.—The patient was given 1,500 c.c. of 5 per cent glucose in normal saline intravenously and external heat was applied. Surgical pituitrin was withheld for fear that uterine contractions would result. A rectal tube was introduced and colonic irrigations with warm normal saline were carried out. The returns were colored but no fecal material appeared.

The perineum was prepared for a possible inevitable premature delivery and the Wangensteen apparatus was again inserted. The temperature ranged from 100.2° F. to 103.6° F. and the pulse rate from 115 to 128. A culture from the abdominal fluid taken at the time of operation revealed no bacteria to be present. On April 20 the patient slept well when undisturbed by the irrigations, the returns of which were light brown in color. A few small flakes of fecal material appeared on this date. Morphine sulphate, gr. ¼, was given twice on this date for pain, and 1,500 c.c. of 5 per cent glucose in normal saline solution was given intravenously twice daily. The temperature and pulse rate remained about the same. On April 21 the patient passed a large amount of brown liquid stool at about 4:30 A.M. and was placed on a liquid diet.

At about 1:30 P.M. the patient's membranes ruptured spontaneously. Rectal examination revealed the cervix to be about 1½ cm. dilated. The patient was transferred to the maternity division where she began having acute labor pains about forty-five minutes after the membranes had ruptured. A scultetus binder was firmly applied. At 2:15 P.M. a bloody show appeared and the pains became more severe. At 3:00 P.M. rectal examination showed 4 cm. dilatation and the cervix was thinning. Dilatation was complete at 3:30 P.M., and the patient was taken to the delivery room where she spontaneously delivered a living, premature baby girl at 4:30 P.M. The placenta was expressed by the modified Credé method at 4:55 P.M. and found to be complete. Infundin, ½ c.c., was given subcutaneously at this time.

After delivery a rectal tube was reinserted, the abdominal binder applied, and the patient was moved to her room. The temperature ranged from 100.4° to 102.8° F. and the pulse from 90 to 120 on this date. At 8:00 P.M. she received 1,500 c.c. of 5 per cent glucose in normal saline with 10 c.c. of calcium lactogluconate, in-

travenously. At 9:00 P.M., pitressin 1 c.c. and morphine, gr. ¼, were given. At 9:15 P.M. the patient had an involuntary bowel movement consisting of a moderate amount of liquid feces.

Postpartum Course.—On April 22 the Wangensteen apparatus was still in use. One cubic centimeter of pitressin was given every four hours for six doses. Sodium luminal, gr. ii, was given as a sedative and the patient was allowed tea and ice chips. Between 1:00 A.M. and 8:00 A.M. the patient had four involuntary bowel movements of liquid stool. The uterus was firm, the lochia normal, but the abdomen appeared to be slightly distended. During the evening the patient felt well enough to read for about an hour.

The Wangensteen apparatus was discontinued. At 8:00 P.M. the patient was given a glass of milk and 3 gr. of sodium ortal, and at 8:15 P.M. there was a voluntary stool which was of liquid to soft consistency.

On April 23 the patient had slept fairly well but awoke with a somewhat rigid abdomen and a rectal tube was inserted for relief. Patient was given a liquid diet on this day. There was a normal bowel movement in the morning and an involuntary one at 5:30 P.M. The day was otherwise uneventful. The temperature ranged from 99 to 100.4° F.

Her general condition now began to improve rapidly. On April 24 she received a soft diet. No more involuntary bowel movements occurred. On April 26 the skin clips and retention sutures were removed and the temperature and pulse rate reached normal. On April 28 the abdominal wound gave way in the lower portion. The wound edges were separated and a quantity of foul-smelling pus escaped. A rubber tissue drain was inserted temporarily into the wound to aid the drainage.

The patient was placed on a regular diet April 29. The remaining course in the hospital was uneventful. The wound infection cleared up rapidly and on May 8 the patient was discharged in very good condition.

The baby weighed 3 pounds, 4 ounces at birth. She was taken direct to the incubator and received formula feedings by gavage and infusions of 5 per cent glucose in normal saline, 60 c.c., for the first two weeks. On June 9, 1936, she weighed 5 pounds, 1 ounce and at the time this is written, is in her twelfth week in good condition.

Béclère, C.: The Passage of Lipiodol Into the Tubes and Into the Peritoneal Cavity. Has It Dangers? Bull. Soc. d'obst. et de gynéc. **25**: 449, 1936.

During the past ten years the author has performed more than 800 hysterosalpingographies. He has also performed the test on 220 women who had uterine hemorrhage, and he has never observed any accidents as a result of this, except in one case where salpingitis occurred. The author is firmly of the belief that the spill of lipiodol into the peritoneal cavity has absolutely no danger. Even where there is a chronic infection of the genitalia and in the uterine cavity itself, it is astonishing how remarkable is the lack of peritoneal reaction from this procedure. On the other hand, the passage of lipiodol into the tubes does carry some risk with it. In about 1 per cent of the cases a salpingitis flares up. This, however, occurs only in cases of cystic salpingitis. The discovery of cystic salpingitis by means of hysterosalpingography has been a revelation to the author. In 66 cases of sterility examined by this procedure, he found cystic salpingitis in 30 per cent. Also, in a series of 75 cases with uterine hemorrhage of unknown origin, the author found cystic salpingitis in 20 per cent. Contrary to many authors, Béclère is of the opinion that uterine hemorrhage of unknown origin is not a contraindication to injection of lipiodol into the uterine cavity.

J. P. GREENHILL.

BILATERAL SIMULTANEOUS TUBAL PREGNANCY

WILLIAM LEVINE, M.D., BROOKLYN, N. Y.

(From the Obstetric and Gynecologic Service of the Beth-El Hospital)

BILATERAL simultaneous tubal pregnancy is infrequent enough and at times might be elusive enough to justify the report of this case. When the calamity occurs in tubal pregnancy, laparotomy and ligation of bleeding vessels is of paramount importance and when this is done, examination of the opposite adnexa is equally if not more important. As will be shown later, the unruptured tube on palpation, at the outset was considered normal, but actual visualization before closure revealed another tubal pregnancy, which if overlooked might have proved very unfortunate to the patient and embarrassing to the operator.

The presence of a bilateral corpus luteum leads one to doubt whether the cyclic maturation of one follicle is the accepted order. Here both ovaries had corpora lutea present, and undoubtedly the maturation of two follicles had taken place; two ova were extruded and each probably fertilized in their respective tubes, and there arrested to give us this rare condition of bilateral concurrent tubal pregnancy. The only other condition which might account for this is superfetation, which would be difficult to prove. Suffice it to say however, that the pathologic report does not substantiate the presence of embryos of different lengths of gestation.

Siegler reported a case in which one side had a ruptured tubal pregnancy, while the opposite side showed evidence of a tubal abortion. He reviewed the literature and, although the first case was reported in 1890, only 16 authentic cases were found to be on record according to Schochardt, quoting Cheval, who reported another case in 1928. In 1931 Meyer found that there were 28 authentic cases. Another case was reported as recent as 1932, by F. D. Johnson.

Case Report.—Mrs. L. M. (Hospital number 72002), white, thirty-six years old, admitted to the service of Dr. Oginz, complaining of fainting spells, pain in lower abdomen, and prolonged scanty menstruation. She was married thirteen years, had 2 spontaneous deliveries, twelve and eight years, respectively. She had had three induced abortions since her last delivery, the last one four years ago and all were uncomplicated. Catamenia set in at twelve years of age, regular every twenty-eight days and of three days' duration. Her last regular menstrual period was June 22. On July 20 when the period was expected she began to bleed rather scantily and continued to bleed until two days before admission when she passed a large clot. On the day of admission, Aug. 7, 1935, she experienced dull pain in the lower abdomen and had two fainting spells. During admission to the hospital the admitting physician noted another fainting spell and she fainted again one hour later while in bed. During the last fainting spell she was cold and clammy and there was a decided drop in her blood pressure. The above history was sufficient to lead one to the inevitable conclusion of a ruptured tubal pregnancy for the physical examination was of very little value.

Laboratory Findings.—R.B.C. 3,900,000, Hemoglobin 88 per cent, W.B.C. 13,500 with 82 per cent polymorphonuclears and 18 per cent mononuclears. The blood pressure was 120/84. The urine was negative.

Physical Examination.—An adult female seen on admission not acutely ill and of fair hemocomponent with moderately rapid pulse. Abdomen moderately obese, tender in lower right side, no Cullen's sign present. Vaginally there was a multiparous outlet, thick mucopurulent vaginal discharge. Cervix tender to touch and

on speculum examination revealed to be eroded, cystic, and had a small cervical polyp protruding from external os. Uterus was well anterior but the size could not be made out. No masses or tenderness was felt in either fornix.

Operation.—Laparotomy two hours after admission revealed the following: The peritoneal cavity was filled with free and clotted blood, and after removal of some

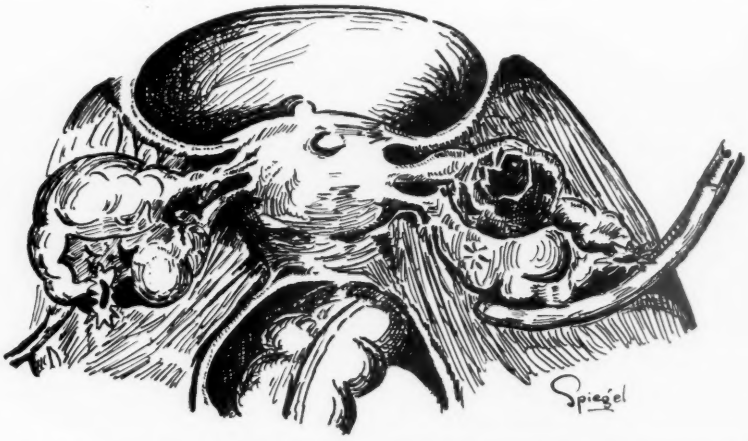

Fig. 1.—Schematic drawing of ruptured right tubal pregnancy and unruptured left.

Fig. 2.—High powered microphotograph of left tube, showing young edematous chorionic villus within the lumen. The wall lining the lumen is composed of decidual cells.

of the clots the left adnexa appeared to be normal to the examining hand, but the right tube was felt to be ruptured. The right tube and ovary were removed. The uterus appeared definitely larger than normal and two small fibroids the size of a hazelnut were on the anterior wall of the uterus. These were enucleated and the rent was closed over by interrupted chromic No. 2 sutures. Inspection of the left side immediately before closure revealed a dilatation in midportion of the tube which

was concluded to be another tubal pregnancy. The ovary on that side showed the presence of a recent corpus luteum. The left tube was removed, leaving the ovary in situ. The abdomen was closed in layers.

Pathologic Report.—Specimen consisted of 2 fallopian tubes, right ovary, and two small fibrous tumors. The left tube was dilated 5 cm. from the fimbriated

Fig. 3.—High powered microphotograph of right tube, showing the wall lining the lumen entirely converted into decidual tissue. Note the irregular character of the decidual cells.

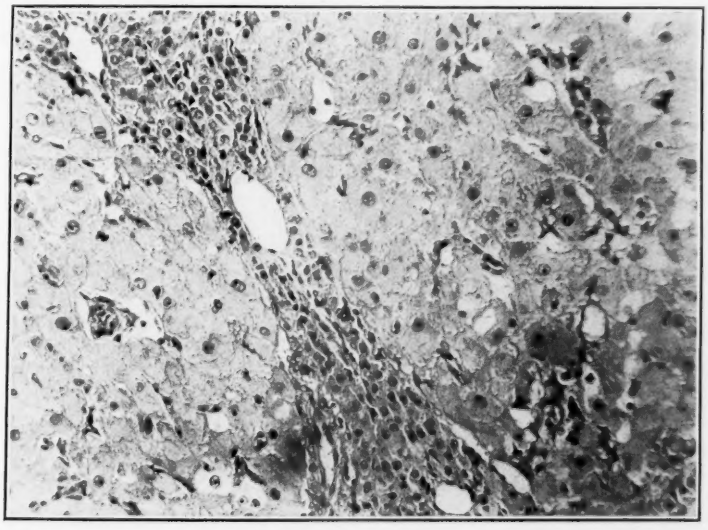

Fig. 4.—High powered microphotograph of right ovary, showing a part of its contained corpus luteum vera.

end to diameter of 2 cm.; the serosa was dark red, glistening, no rupture. Sections showed thin tubal wall with lumen filled completely by chorionic villi within which was a complete amniotic sac which contained a tiny curled wormlike embryo 2 cm. and ½ mm. across. The mesosalpinx in relation to this part of the tube contained dark hemorrhagic material.

Right tube was dilated about 3 cm. from fimbria. The serosa was dark red, wall was thin and ruptured in the dilated area with blood clot in which were present chorionic villi. No fetal parts were found.

Right ovary had a corpus luteum 10 cm. in diameter. The 2 fibrous tumors each 1 cm. in diameter presented interlacing whorls of fibrous tissue.

Microscopic Findings.—Section of right tube showed layers of the tubal wall completely disoriented by edema, congestion, and infiltrated by numerous masses of trophoblasts. The tube proximal to the area of gestation showed edema, congestion, and leucocytic infiltration but no evidence of previous chronic infiltration. Section of right ovary showed a large vascularized corpus luteum and an occasional follicular cyst.

Section of left tube showed the lumen occupied by numerous chorionic villi; the mucosa had been replaced by a thick zone of deciduoid cells. The tubal wall was intensely edematous, congested, and diffusely infiltrated with small round cells and polymorphonuclear leucocytes. Section of tube proximal to site of gestation showed no evidence of chronic infiltration.

Diagnosis.—Right tubal gestation ruptured, left tubal gestation unruptured, and right corpus luteum vera.

The postoperative course was rather stormy. Immediately after the operation she became markedly distended and the distention was limited to the upper abdomen. On the fourth postoperative day, during the expulsion of an enema, she suddenly felt a puffing up of the left labia, which soon became ecchymotic and swollen. This was later determined to be a ruptured varix in the left vulva. After applying pressure and cold packs to that area, the bleeding was controlled and ecchymosis spread to the opposite side down the buttocks and to the left groin and lower portion of the abdomen. On the day of discharge the ecchymosis had entirely disappeared.

On the eighth postoperative day, the patient eviscerated and was taken to the operating room and the abdominal wound resutured. For two days after the resuturing of the abdominal wound, distention continued and was combated by enemas, rectal tube, and pituitrin. After that the postoperative course was uneventful. The patient was discharged on the twenty-fourth day after the operation, and at that time the abdominal wound was intact and firm throughout. The ecchymosis from the ruptured varix had almost entirely disappeared. Vaginal examination revealed the cervix high in the vagina and freely movable. The uterus was found in normal position and both fornices were normal.

1363 EASTERN PARKWAY

Yamabe, A., and Yun, T. W.: A Case of Spina Bifida Diagnosed During Pregnancy, Jap. J. Obst. & Gynec. **19**: 119, 1936.

In a case of hydramnios the authors could not make a diagnosis of fetal presentation. They, therefore, took an x-ray picture and were surprised to find a case of spina bifida. After delivery they verified the diagnosis. They emphasize the necessity of taking x-ray pictures in all cases where malformations of the fetus are suspected but not diagnosed for certain.

J. P. GREENHILL.

ABDOMINAL PREGNANCY. DIAGNOSIS CONFIRMED BY HYSTEROGRAPHY*

S. Louis Friedman, M.D., F.A.C.S., Brooklyn, N. Y.
(From the Obstetric Service of the Beth-El Hospital)

ALTHOUGH hysterography has been used for many purposes in gynecology, a careful search of the literature reveals but seven reports where this method was used to aid a diagnosis where abdominal pregnancy was present.[1]

Mrs. R. R., white, housewife, aged thirty-four years, para i, gravida vi, presented herself for prenatal care in the fourth month of gestation. Last menstrual period was on Dec. 6, 1934; the date of expected delivery was Sept. 12, 1935.

Menstruation began at the age of twelve years, normal in type. Patient had been married twelve years. Husband contracted a neisserian infection seven years ago, which was apparently transmitted to the wife, who gives a history of pelvic inflammatory disease shortly after this. Patient has one child living and well, aged ten years. This was a spontaneous delivery with normal puerperium.

She had had one spontaneous abortion and two induced abortions with no apparent sequelae.

Six years ago patient had a tubal gestation, at which time a right salpingo-oophorectomy and appendectomy were performed. She had an uneventful recovery and was discharged from hospital on the fourteenth day.

Patient reported for examination every three weeks. The first visit was made in March, 1935, when she gave a history of having pain in the abdomen for the past eight weeks with slight bleeding from time to time.

She had previously been attended at another clinic, where she was informed that it would be advisable for her to undergo laparotomy for the investigation of her pain and bleeding.

Examination revealed the fundus to be increased in size and exhibiting all the signs of a four months' gestation. There was no bleeding and no pain at this time.

Urinalysis was negative throughout and blood pressure within normal limits. Weight increase was steady and constant until the seventh month of gestation, when she lost weight rapidly and consistently.

On June 15, 1935, the fetal heart was heard at the median line above the umbilicus, and the outline of ovum appeared normal for this stage of gestation.

On July 25, 1935, patient complained of not having felt fetal movements and the heart could no longer be heard. No change in the size, shape, or consistency of ovoid was observed at this time.

On Aug. 8, 1935, patient was again examined. Fetal heart was not heard. There was no pain or bleeding, but persistent loss of weight.

On Aug. 22, 1935, she had a slight bloody discharge from the vagina. At this examination the fundal mass was palpable below the umbilicus and was the size of a four months' gestation. The fetus was movable above the fundal mass. These findings gave the impression of abdominal pregnancy with dead fetus, and the patient was ordered to the hospital.

*Presented at a meeting of the Brooklyn Gynecological Society, November 6, 1936.

Patient was admitted to the Beth-El Hospital on Aug. 26, 1935. Lungs were negative. Heart presented a systolic murmur at apex and slight tachycardia. General examination otherwise negative.

Abdominal Examination.—Relaxed abdominal wall. Midline scar of previous operation. Fundus palpable two fingerbreadths above the symphysis. Above the fundal mass, another mass the size of a large orange was palpable, with smaller masses transversely across to the right side. These were freely movable with a sense of hardness like that of small parts. No fetal heart sounds were heard.

Vaginal Examination.—There was visible vaginal bleeding. Cervix high and in the axis of vagina. Abdominal mass was movable with the cervix. Fornices were negative. Uterus could not be mapped out definitely.

The Friedman test was done on August 27 and reported negative on Aug. 29, 1935.

Fig. 1.

X-rays were taken on August 27 and on August 30, with following findings: "Fetus lying transversely across the abdomen with head on the left side anteriorly, with the fetal spine almost at right angle to the maternal spine. There is no definite evidence of overriding of the skull bones. It appears to be extrauterine." (Fig. 1.)

Hysterography was performed by injecting 15 c.c. of lipiodol into the uterus and x-rays taken, one after injection of 10 c.c. of lipiodol and another exposure after the full amount. A third exposure was taken after the removal of the cannula.

Hysterography showed on first exposure filling of uterus and part of left tube and second exposure showed complete filling of the tube and irregular filling of the uterine cavity, not reaching above the pubes (Fig. 2).

The diagnosis of extrauterine pregnancy was thus confirmed.

Laparotomy was performed on Aug. 30, 1935, under spinal anesthesia. A seven months' macerated fetus was found free in the abdomen. Membranes were ruptured, there being no evidence of liquor amnii. A large placenta was found resting on top of the uterus, the concavity of the placenta resting over the convexity of the

uterus, as is clearly shown in the photograph. The fimbriated end of the left tube was adherent to the placenta. A portion of placenta was attached to the left broad ligament. Part of the membranes were found attached to the small intestine and postparietal peritoneum and these were left in place.

Resection of the broad ligament and left tube together with fixation of the uterus was done. The right tube and ovary missing, removed at previous operation. Abdomen was closed in layers in the usual manner.

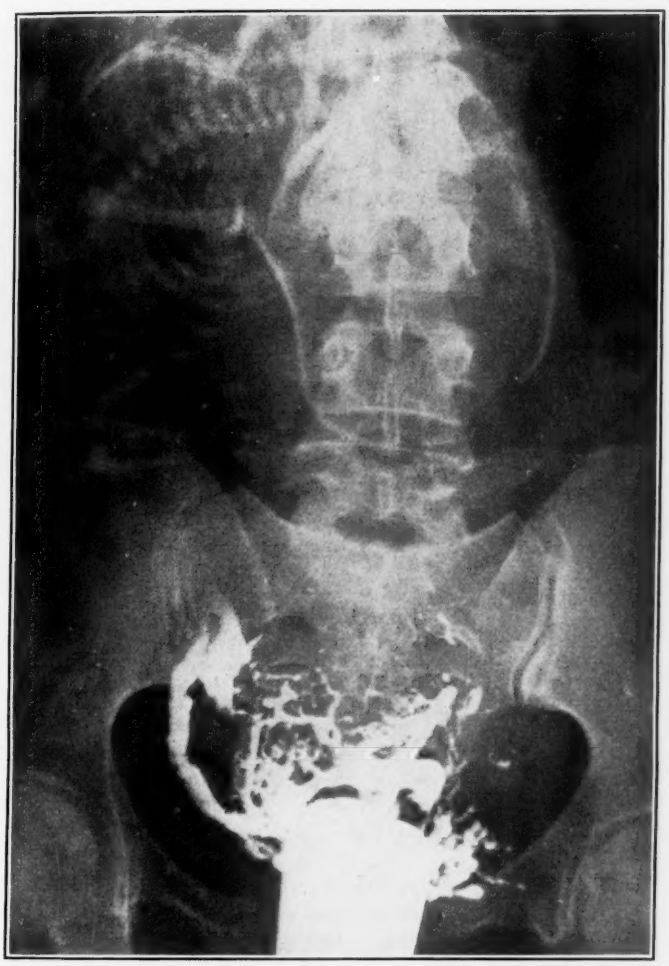

Fig. 2.

Laboratory Findings.—Urinalysis was negative throughout stay in hospital. Blood pressure within normal limits, and blood count was as follows: Erythrocytes 4,200,000, leucocytes 9,200, hemoglobin 85 per cent, polymorphonuclears 71 per cent, and monocytes 29 per cent.

Patient was out of bed on the fourteenth day and discharged on the seventeenth day in good condition. Wound healed by primary union. Bimanual examination on discharge showed fundus anterior, fixation holding, no masses and no tenderness.

Follow-Up.—On Nov. 6, 1935, six weeks after operation, patient exhibited a persistent vaginitis and evidence of climacteric changes. Treatment for vaginitis instituted. Abdominal scar was firm, dry, and clean.

On Nov. 22, 1935, vaginitis was much improved and her general condition was very good.

On Dec. 20, 1935, vaginitis had entirely cleared up and her general condition was excellent. The abdominal scar was firm, with no evidence of herniation. Patient discharged.

COMMENT

This extrauterine pregnancy evidently resulted from a second ectopic following the first which was in the right tube. It aborted through the left tube and found its nidation at the fimbriated end of the left tube, as shown by the firm attachment to the placenta. This calls to our attention the fact that where there has been an ectopic on one side following neisserian infection, there is the possibility of another ectopic occurring in the opposite tube.

The suspicion of extrauterine pregnancy was aroused by the patient's symptoms of pain and some bleeding during the first two months of gestation, but diagnosis could not be established as long as the membranes were intact and the fetus confined to the amniotic sac, giving the impression of intrauterine pregnancy. After the rupture of membranes and cessation of fetal heart, diagnosis of extrauterine pregnancy was immediately suspected.

While the flat x-ray plate showed the fetus lying transversely, it still did not absolutely exclude an extrauterine pregnancy. The use of hysterography, however, definitely confirmed our impressions.

220 New York Avenue

A GIANT OVARIAN CYST

Charles G. Strickland, M.D., Erie, Pa.

(From the Hamot Hospital)

ON JULY 8, 1936, there was admitted to Hamot Hospital a patient with a giant ovarian cyst. Measured by most conservative standards this tumor, as seen first, must have weighed 160 pounds and probably ran considerably over that figure. The patient, an Iroquois Indian, was a married woman of thirty-four years, who had one normal child seven years old. About thirty months prior to admission her abdomen began to increase in size. At first she deemed herself pregnant but after nine months had elapsed, during which time she had regular periods, the patient consulted a physician who told her that the supposed pregnancy was an ovarian cyst. This woman was a sincere Christian Scientist and, as a result, not only refused the surgical relief offered at that time but so far as is known was treated only by Christian Science practitioners from that time until her hospital admission. Her tremendous size, her obvious distress, and her profound weakness at last drove her to the hospital. For the sake of brevity, only essential points will be mentioned in the following physical examination.

An emaciated woman with tremendous overdistention of the abdomen and in obvious distress. She was orthopneic and showed marked edema of both legs. Her height was 5 feet, 3¼ inches and her weight 296 pounds. (Her normal weight had been 150 pounds.) The superficial veins of the neck were engorged and the whole

side of the neck pulsated with each cardiac impulse. The lower lobes of both lungs were compressed and the heart was displaced up into the left axilla. The maximum circumference of the abdomen was 68¼ inches. The engorgement of the veins of the abdominal and chest walls was marked. The distention of the abdomen and the edema of the legs are too well shown in Fig. 1 to need further comment.

The blood count showed hemoglobin, 27 per cent; white blood cells, 9,000; reds, 2,040,000. The Wassermann blood chemistry and urine were essentially normal. The blood pressure was 136/86. The temperature was 99.8° F., the pulse 104, and the respiration 28 on admission.

Three immediate indications for treatment seemed obvious: Slow decompression of the cyst, blood transfusion, and forced feeding and forced fluids.

The first paracentesis was done on July 10, 1936, with a very gradual withdrawal of fluid to the extent of 9 gallons, 77 pounds by weight. The second paracentesis

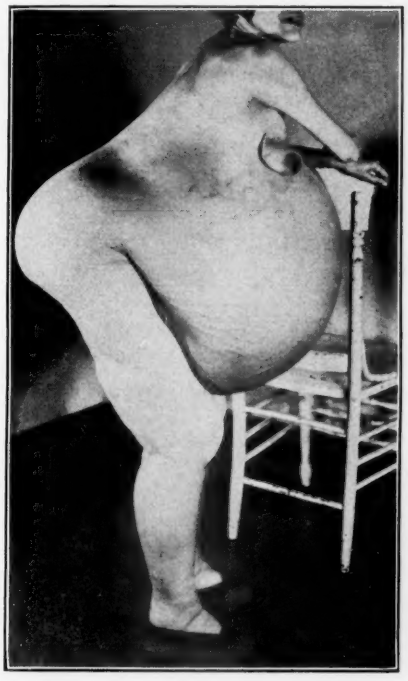

Fig. 1.

was on July 19 and gave 6¼ gallons or 54 pounds of fluid. The third paracentesis was on August 14 and amounted to 3½ gallons or 34 pounds, or a grand total of 18¾ gallons, 165 pounds of fluid.

Three transfusions of blood by the direct method were done, one each on July 13, 16, and 21. In spite of careful blood typing and cross matching, the third transfusion was followed by an urticarial outbreak and fourteen days of continuous fever which could be explained only on the basis of serum sickness, inasmuch as all physical examination including x-rays of the chest and all laboratory tests failed to disclose any other cause of the fever.

The fever terminated by lysis on August 4, to be replaced as a disturbing factor by an acute serous diarrhea coupled with an acute herpetic glossitis. During this we experienced great difficulty not only in controlling the diarrhea but in feeding the patient and finally had to resort to nasal gavage.

In spite of our best efforts, including considerable stimulation and many glucose transfusions, the patient progressively lost strength and died August 21 in an attack of acute pulmonary edema. The weight of the patient six days before death was 160 pounds. At no time was she considered even a fair risk for surgery nor do I personally believe that she could have survived surgical procedure at any time subsequent to her admission.

A postmortem examination was done. The tumor was a pseudomucinous cystadenoma of the right ovary. The rest of the pelvic organs were normal. The cystadenoma had two large compartments containing 7½ gallons or 71 pounds of fluid. The cyst wall was lightly adherent to the abdominal wall probably as a result of the tapping but elsewhere free. The cadaver after removal of the tumor weighed 93 pounds. The sac of the tumor weighed 4 pounds. Microscopic findings were typical ones of a pseudomucinous cystadenoma. The cyst fluid was dark brown in color and the consistency of a thin syrup. The specific gravity was 1026 and the reaction slightly alkaline. It contained 3.8 per cent albumin but no sugar. All specimens including those from the tappings were sterile.

This case is reported because apparently it exceeds in size any recently noted.

153 West Seventh Street

CONGENITAL HYDROTHORAX

Fred A. Kassebohm, M.D., and Milton J. Schreiber, B.S., M.D.,
New York, N. Y.

(From The Obstetrical Service of The Lutheran Hospital of Manhattan)

Ballantyne has defined general fetal edema as "a morbid condition of the fetus characterized by general anasarca, by the presence of fluid effusions in the peritoneal, pleural, and pericardial sacs and usually by edema of the placenta." The disease is uncommon yet adequately represented in the literature in the writings of Ballantyne and Schumann. Congenital hydrothorax (bilateral) entirely dissociated from hydrops universalis is rare. The case herein presented conforms to the general rule which holds that fetal edema reflects maternal toxicity. The unusual manifestation of the effect of toxicity prompts the presentation of the findings.

Mrs. M. M., housewife, aged thirty-one years, was first seen in the Out-Patient Department of The Lutheran Hospital of Manhattan on May 28, 1936. Her family and personal histories were negative with the exception of an appendectomy in 1931. Several days following the operation she had a spontaneous miscarriage at the fifth month.

When first seen the fundus was the size of a four months' gestation, pelvis negative, general physical condition excellent. Her blood pressure was 150/90. This was called to her attention and she was advised to abstain from proteins and salts; to rest in bed twice daily; to limit fluids and to purge herself every third day. On this regime the blood pressure dropped to 134/84 and the urine, which previously had a trace of albumin, became clear. She was seen at biweekly intervals. On October 8, a marked increase in the size of the fundus was noted. In addition, blood pressure had risen to 150/92 and she complained of vomiting, headache, and blurring of vision. Ophthalmoscopic examination was negative and x-ray of the abdomen failed to reveal any gross pathology in the fetus. She was advised to rest in bed at home.

On October 15 her blood pressure rose to 182/104, the trace of albumin reappeared in the urine, and she complained of epigastric distress and headache. The fundus was tense and measured 44 cm. (MacDonald). The fetal heart was audible. Hospitalization was advised.

On October 16 she was admitted to the service. On a Karrell diet, absolute bed rest, sedation and purgation, the blood pressure fell to 150/80 and the urine cleared. She became symptom-free. On October 21 with the blood pressure 150/88, vomiting, headache and blurring of vision recurred. Labor was immediately induced by rupture of the membranes and subsequent small doses of pitocin. The cervix rapidly dilated, but after two hours of full dilatation, vaginal examination revealed a deep transverse arrest and delivery was completed by rotation of the vertex with the Kielland and extraction by Simpson forceps. A female child, weighing 7 pounds 9 ounces and appearing normal in all respects, was delivered. The baby breathed while the cord was clamped and cut, then, with a strong fetal heart palpable, respiration ceased. The infant was transferred to a warm bath and the trachea was aspirated. Alpha lobelin was injected into the umbilical vein and shortly thereafter respiratory efforts were noted and carbon dioxide and oxygen administered. An irregular, gasping respiration resulted and continued for thirty minutes when again respiration ceased. The fetal heart was palpable and stimulation with carbon dioxide and oxygen, alpha lobelin and coramine was continued. The fetal heart became irregular and efforts to stimulate respiration were futile. As it appeared that cessation of the fetal heart function was imminent, a final attempt at stimulation was made by endeavoring to administer an intracardiac injection of adrenalin. The needle was inserted into the thorax through the third left intercostal space, close to the sternum. When the piston of the syringe was drawn up to determine whether or not the heart had been entered, there was drawn up 2 c.c. of a clear, straw-colored fluid. This was ejected into a test tube and more of the same type of fluid obtained. At this time it was noted that the fetal heart had ceased. The needle was then inserted into the right thorax and identical fluid was obtained. Abdominal paracentesis was then performed without result.

The necropsy showed the following relevant findings. "The body is that of a very well-nourished and developed baby, with no apparent congenital anomalies. The head appears somewhat cyanotic. There is a superficial abrasion just below the right eye. There is a moderate degree of edema of both lids. There is no edema of the extremities. . . . On reflecting the scalp there was moderate evidence of caput succedaneum. A window was cut in both sides of the calvarium. There was no evidence of subdural hemorrhage. . . . The cerebral hemispheres were removed and there was no evidence of hemorrhage in the brain substance. A small triangular rent was found just above the level of attachment of the falx to the tentorium. There was no hemorrhage in this area. . . . The pons, cerebellum and medulla were all normal. . . . The chest plate was removed . . . a bilateral hydrothorax was seen. The fluid present was pale amber in color and clear. The right pleural sac contained 100 c.c. of the fluid and the left sac contained 43 c.c. The specific gravity of the fluid was 1.014. . . . The lungs were collapsed toward the hilus. Both were firm in consistency and did not crepitate. Section revealed a typical atelectasis. . . . The pericardium was normal. The heart was normal in size and position. Careful examination failed to reveal congenital anomalies of the heart or great vessels. The myocardium was not remarkable. . . . The thymus weighed 17 gm. . . . On opening the peritoneal cavity an escape of gas was noted, due to the air inadvertently introduced during paracentesis. There was no fluid or exudate present in this cavity. Careful examination failed to reveal abnormality in the gastrointestinal tract. . . . The liver, gallbladder and biliary ducts were negative. . . . The spleen

was normal. . . . Pancreas and adrenals were negative. . . . There was no evidence of gross lesions in the kidneys. . . . Ureters and bladder were normal. . . . Uterus and adnexa were normal.''

Microscopic examination of all vital organs revealed no pathology. The fluid possessed all the characteristics of a transudate. Smears were negative save for a few lymphoid cells. Cultures of the fluid failed to produce any growth.

The interpretation of these findings is problematical. We are inclined to the conception that this hydrothorax is an early manifestation of hydrops universalis, although we have no scientific support for this. In the absence of organic pathology other than atelectasis, the etiologic factor must be allocated to the preeclampsia and polyhydramnios of the mother. We have no explanation for this isolated manifestation of toxicity. The case is presented as a rare fetal anomaly; an example of the effects of maternal toxicity on the fetus; an addition to the list of fetal diseases usually found in association with polyhydramnios.

272 WEST 90 STREET
509 WEST 155 STREET

CYCLIC PHENOMENA ASSOCIATED WITH MENSTRUATION, EARLY PREGNANCY AND INDUCED ABORTION IN A HEALTHY WOMAN

CARL G. HARTMAN, PH.D., BALTIMORE, MD., AND RAYMOND SQUIER, M.D., NEW YORK, N. Y.

(From the National Committee on Maternal Health, Inc.)

IN HIS recently published book on the *Time of Ovulation in Women,* Hartman[1] emphasizes the element of doubt which still exists on this subject and adds: ''I know of only one way of finally dispelling this doubt and that lies with the women themselves. If a sufficient number of intelligent and scientifically inclined women . . . were to keep a punctilious record of their sex life and eventually make the record available for anonymous publication, the cumulative evidence of several thousand such records might help.''

As an example of the kind of records wanted the present authors desire to offer the following case history, which includes several points of unusual interest.

The record is that of a young biologist, of nonmedical training, whose menstrual history from 1928 to 1935 has already been published (Hartman, 1936, Fig. 27, page 69). The cycles were mostly over thirty days in length. Early in 1935 she began recording on the calendar two phenomena in addition to the periodic bleeding. These she had noted for some years but had not recorded on the calendar. The first always occurs in the midinterval and consists of an evanescent overabundance of mucous secretion in the vagina, doubtless of cervical origin (Cf. Séguy and Simonnet, 1933).[2] The second phenomenon consists of turgor and tenderness of the breasts, noticeable only in the last third of the cycle and continuing usually for several days of the menstrual period.

If we are to judge from what occurs in the monkey cervix upon injection of estrone (e.g. Amniotin, Squibb), we may interpret the excess mucus secreted by the cervix in the midinterval as an expression of a high level of the hormone in the blood stream at that time.

The fullness of the breasts, on the other hand, is an expression of the activity of the corpus luteum hormone. This conclusion is in accord with theoretical considerations and is borne out by two observations:

1. The continued and increasing breast turgor during the pregnancy, so long as it continued and sixteen days after abortion.

2. By the nonreappearance of the symptoms for five cycles following the abortion. This may be due to failure of ovulation or to refractoriness of the previously hypertrophied mammary parenchyma during the two months of pregnancy.

The absence of breast symptoms for several months argues also for the genuineness of the woman's subjective observations and lends confidence to the record, as reflecting physiologic conditions rather than states of mind or realization of expected phenomena.

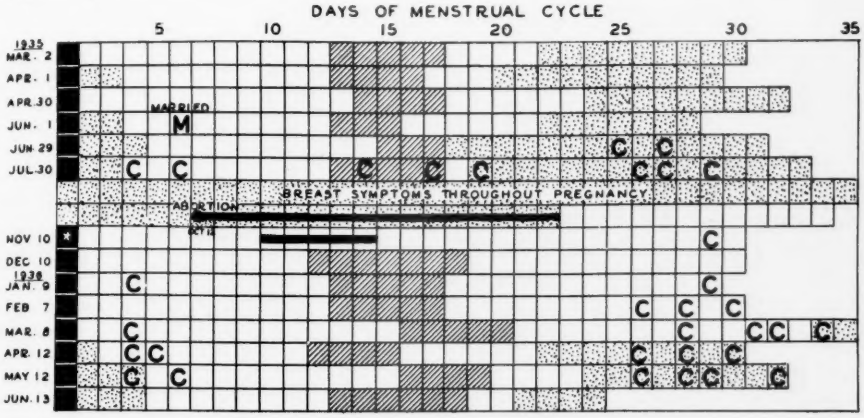

Fig. 1.—Chart showing carefully recorded menstrual history and associated phenomena of a thirty-one-year-old woman, married June 6, 1935 (*"M"* in chart). On abscissae, days of menstrual cycle. Black squares, first days of the menses (dates given at left). Black square with white asterisk, first menstruation following the induced abortion. Cross-hatched bars, days on which abundant cervical mucus appeared in vagina. Stippled bars, breast symptoms. *C*, coitus without use of contraceptives (coitus at other times when the vaginal pessary was used is not indicated in chart). Uterus emptied by curettage Oct. 12, 1935 (black dot in chart); horizontal black column thereafter marks uterine bleeding following curettage; breast symptoms continued for the same period, then disappeared for more than five months. Second black bar, light bleeding in the midinterval of succeeding cycle.

In the chart are recorded (*C*) copulations without the use of contraceptives. The times when a vaginal occlusive pessary was worn were not entered and are not reported. The couple, it may be added, are trying out the "safe period" according to our calculations and, not wishing a family for several years, practice birth control in the ovulation days approximately according to Knaus and Ogino. But during a vacation trip into the mountains in August they were careless, and the wife conceived on one of these days: thirteenth, sixteenth, or eighteenth of the cycle, day thirteen being the most likely. The uterus was curetted by an unknown physician on October twelfth, presumably sixty-one days after conception.

Then uterine bleeding was noted for sixteen days. The first menstruation thereafter began twenty-nine days after the curettage.

An intermenstrual bleeding occurred in the succeeding cycle, the mucous secretion from the second succeeding cycle on, breast symptoms not until the fifth succeeding cycle.

This case history offers one more protocol, carefully and intelligently recorded, pointing to midinterval ovulation. It furthermore is an example of the kind of data we should like to acquire in large numbers. Physicians soliciting such records should look first and foremost to the reliability of the person keeping the record and her conscientiousness in putting the data on the calendar at the time and never from memory, days or weeks later.

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PERSISTENT FETAL TACHYCARDIA AND NEONATAL INTESTINAL OBSTRUCTION DUE TO INTERNAL HERNIA BENEATH THE UMBILICAL VEIN

RICHARD B. SCHUTZ, M.D., AND A. M. ZIEGLER, M.D., KANSAS CITY, MO.

THE following case is being reported as a rare type of hernia with obstruction in the newborn, in which the mechanics were such as to partially obstruct the umbilical vein as it passes through the ligamentum teres from umbilicus to liver, and to such a degree that compensatory fetal tachycardia was produced, and finally intestinal obstruction.

The patient was a twenty-seven-year-old primigravida, who was normal physically except for a slight secondary anemia. The Wassermann test was negative. The prenatal course was uneventful except for a moderate polyhydramnios and a persistent edema of the feet and ankles. In spite of excessively hot weather and copious perspiration, the specific gravity of repeated urine specimens remained below 1.005, until just a week before the onset of labor when it became normal.

At five and one-half months the fetal heart sounds were first observed. They were regular and easily heard, but the rate was 160, and on repeated examinations, until term, varied from 160 to 180 per minute.

Two weeks before term, on July 13, 1936, premature rupture of the membranes occurred, followed on the next day by a vigorous labor of three hours' duration, which resulted in the spontaneous delivery, O.L.A., of a female infant weighing 5 pounds and 12 ounces. During labor the uterine contractions were so severe as to require inhalation ether to control them, and the heart sounds, though regular, ranged in rate from 180 to over 200. Though the baby required very little resuscitation the heart rate did not fall below 170 for the first thirty-six hours, postpartum. Within a few hours after birth there began a series of profound cyanotic spells requiring coramine and O_2-CO_2 for relief. Feedings were regurgitated from the first and continued thus, so fluids were given subcutaneously. After twenty-four hours the infant frequently regurgitated brownish and slightly blood-tinged mucus. Urine and several meconium stools were passed. The temperature varied from 97° to

103° F. About thirty-six hours after birth, the heart rate became approximately normal ranging from 140 to 150 and the spells of cyanosis were less frequent. On the third day, however, a persistent irregularity of heartbeat developed with variations in rhythm, rate, and intensity, which was partially relieved for an hour or so after coramine administration. The cyanosis became more severe. A soft upper abdominal distention then appeared which grew progressively worse. Bowel obstruction of some variety was suspected, but fearing to increase the exhaustion of the patient, x-ray studies were omitted and a laparotomy was performed on July 20, although the child's condition appeared hopeless.

Preoperative Diagnosis: Pyloric stenosis, or intestinal obstruction.

Findings.—The obliterating umbilical vein to the liver was elevated 1 to 1½ inches and covered with peritoneum containing an aperture through which protruded a large segment of small bowel. The bowel was not completely obstructed but its position produced a torsion on the mesentery and a pull on the pylorus preventing it from free mobility.

About 10 to 12 cm. of bowel protruded through the aperture in the pseudomesentery from the left to right side and twisted ventrally to the left. The pylorus showed no pathology.

Procedure.—Under local anesthesia a right paramedian incision was made, dividing the layers of the abdominal wall from just below the costal margin to about an inch above the umbilicus. The right rectus muscle was separated and the peritoneum opened. An attempt to elevate the pylorus showed it to be fixed. Further exploration revealed a pseudomesentery over the ligamentum teres through which there was an aperture as described. The ligament was doubly clamped and ligated. This allowed the herniated loop of bowel to return to its normal position and the pylorus to become free. All bleeding points were ligated and the abdominal wound was closed in layers. Tension sutures were placed in the wound. No drainage was employed. Postoperative condition was only fair, and death occurred a few hours later.

An autopsy was performed and there was no evidence of congenital cardiac or pulmonary defect. The final anatomic diagnosis was as follows: Ligated, severed ligamentum teres, mesenteric torsion, patent foramen ovale, acute dilatation of the heart, confluent hemorrhagic bronchopneumonia, uric acid infarcts of the kidney, passive congestion of the liver and spleen, obliterated ductus arteriosus.

A review of the literature on congenital anomalies of the umbilical vein and peritoneum revealed no reports of a similar case. Cullen states that an elevation of the peritoneum over the umbilical vein in the form of a mesentery occurred in three out of fifty cases examined, but there is no mention of an aperture in this structure between the vein and the anterior abdominal wall.

Our hypotheses as to the cause of the clinical phenomena observed in this case are as follows:

1. A knuckle of small intestine entered the aperture between the umbilical vein and abdominal wall not later than five and one-half months of gestation at which time the fetal tachycardia was first observed.

2. The pressure of the bowel against the vein was sufficient to interfere with the passage of a normal volume of oxygenated blood from the placenta to the fetus. In this manner the ratio of CO_2 to O_2 was increased in the fetal circulation.

3. There became necessary a compensatory increase in the fetal heart rate to provide sufficient oxygen to the fetus.

4. Probably during labor a larger loop of bowel passed through the aperture and torsion occurred. As the obliterating process progressed in the umbilical vein, it became shorter and more firm, thus increasing the pressure on the bowel and its mesentery, completing the obstruction.

5. The heart rate fell to normal as the infant's O_2 to CO_2 ratio became restored.

6. The striking cardiac irregularity that followed was due to the toxemia attendant on the obstruction and pneumonia.

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201 Plaza Theatre Building

THE ELLIOTT TREATMENT AS PROPHYLAXIS FOR GONORRHEA IN THE FEMALE

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PROPHYLACTIC treatment for gonorrhea in the male has been used for years with gratifying success, but comparable methods are discouragingly inefficient when applied to the female.[1] One has only to consider the principles of chemic prophylaxis and at the same time review the different anatomic and pathologic bases of gonorrhea in the two sexes to appreciate the reason for this. In the male, gonorrhea begins as an inflammation of the terminal portion of the pendulous urethra, lined with resistant stratified squamous epithelium, and almost devoid of glandular structures. In the woman, infective material is deposited upon the urethral meatus and the cervix uteri, both rich in glands and exposed during coitus to a massaging action which tends to implant the gonococcus in deeper layers of tissue than in the man. The anatomy of the female genitals also precludes the self-application of drugs which will remain in contact with the vulnerable surfaces for any length of time.

Noting the prompt response of acute uncomplicated gonorrheal cervicitis, urethritis, and paraurethritis to treatment with the Elliott method (no antiseptics being used), it occurred to me that prolonged intense heat might also be employed to prevent the development of the disease if treatment were begun during the stage of incubation. The number of such cases is small, but the uniform success of the method prompts this report.

Case 1.—Patient, married, aged twenty-four years, para i, was seen forty-eight hours after exposure to her husband who noted a gonorrheal discharge eight hours

after coitus. No evidence of disease being found, she was given a series of twelve Elliott treatments. Observation over a period of two years failed to disclose the occurrence of gonorrhea.

CASE 2.—Patient, married, aged thirty years, para i, was exposed to her husband on his return from a trip. He noted a gonorrheal discharge eight hours after the intercourse, and the patient presented herself forty hours after the exposure. No evidence of the disease was found and Elliott treatment was begun. Eight treatments were given, and follow-up for six months failed to show evidence of disease.

CASE 3.—Patient, single, aged twenty-four years, para 0, was exposed on two successive days to a man known to have latent gonorrheal prostatitis and seminal vesiculitis. Examination proving negative, treatment was instituted sixty-four hours after the first exposure. Ten treatments were given and the patient was observed for ten months and no evidence of gonorrhea was found.

CASE 4.—A bride, aged twenty-one, para 0, was exposed on two successive days to her husband, the same contact described in Case 3. By this time his discharge had returned and the patient sought treatment forty-eight hours after her first exposure. Examination being negative for gonorrhea, she was given six treatments. This patient was followed only six weeks, but showed no evidence of disease during that time.

CASE 5.—Patient, married, aged twenty-one years, para 0, was exposed eight hours before her husband noticed his gonorrheal discharge. Showing no evidence of disease, she was given ten Elliott treatments. No evidence of gonorrhea was seen in thirty months, during which time she was observed through a pregnancy.

CASE 6.—Patient, married, aged thirty-two years, para i, was exposed through rupture of condom to her husband who was known to have latent gonorrheal prostatitis. A plain tap water douche was taken eight hours after the exposure. No evidence of disease being found, ten treatments were given, beginning forty hours after exposure. Observation for eight months failed to show evidence of gonorrhea.

COMMENT

None of these women apparently had subclinical gonorrhea at the time of exposure. Unfortunately, complement fixation tests were not done. Four patients were known to have had intercourse over varying periods of time without infecting their partners. In only one instance was any other effort to prevent disease used and that was a plain water douche long after exposure. Natural immunity to the gonococcus does not exist, and it is probable that most of these women would have developed gonorrhea.

The technic of treatment excluded the use of douches, injections, and topical applications. The vaginal bag only was used in this series, but it might add to the efficiency of the method if a urethral applicator were used in series with it. Maximum temperature and pressure were given for forty-five minutes on the third day and for one hour thereafter. No burns were observed, and one patient was treated throughout her menstrual period without ill effect. The number of treatments was intentionally varied, but this series of cases is much too small to arrive at any definite conclusion as to the minimum number required. It is

probable that the number of treatments should be proportional to the time elapsed between exposure and the institution of therapy. In that case, a patient seen near the end of the average incubation period of gonorrhea would require about as many treatments as would a case of early uncomplicated gonorrheal urethritis and cervicitis.

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384 Peachtree Street, N. E.

IMPACTED AND INCARCERATED CERVICAL FIBROID COMPLICATING PREGNANCY

Supravaginal Hysterectomy

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(From the Obstetric Service of the Polyclinic Hospital)

MRS. A. V., thirty-eight years old, Italian, married fifteen years, one child, thirteen years old. Last menstruation, middle of February.

During April, 1936, the patient complained of uterine bleeding, following two months' amenorrhea and pain in the pelvis. A diagnosis of impacted fibroid complicating pregnancy was made and operation advised. At that time there was a possibility of doing a myomectomy and the patient was so informed. She did not accept the advice and was not seen until six weeks later.

On June 5, patient was admited to Dr. Ladin's Service at the New York Polyclinic Hospital. She stated that during the week prior to her admission, she suffered from very intense pressing pains in the pelvis and lower abdomen, had difficulty in urination and defecation and was unable to move about. There was no uterine bleeding.

Preoperative Findings.—Bimanual examination on admission revealed that the mass had grown much larger since April and was thoroughly incarcerated in the pelvis. The cervix pointed upward and rested against the symphysis, and palpation of the tumor with the finger in the cervical canal showed that it consisted principally of a submucous fibroid, springing from the posterior wall of the cervix. The uterus and tumor filled the entire pelvis and extended upward to midway between the symphysis and umbilicus, especially on the right side. Complete and satisfactory bimanual examination was impossible because of the impaction of the pelvic tumor, but several fibroids could be palpated through the abdominal wall. The upper left cornu presented some fluctuation, evidently the site of pregnancy. In view of the size, position, and especially because of the submucous type of the cervical fibroid and its impaction, a myomectomy was out of the question and a hysterectomy was decided on.

Operation.—A median incision was made in the lower abdomen. Preoperative findings were confirmed. Notwithstanding the large abdominal incision it was impossible to budge the uterus out of the pelvis by traction until both infundibulopelvic

ligaments were ligated and the broad ligaments were divided. It was only then that the uterus was lifted out of the pelvis into the abdominal incision. The right ovary contained the corpus luteum of pregnancy, the left ovary was small and sclerotic, but because of the excessive varicosities of the left broad ligament, it was decided to remove that ovary as well as the right which contained the corpus luteum. A supravaginal hysterectomy with a very low cervical incision was performed together with a bilateral salpingo-oophorectomy. The appendix was not removed. The patient made an uneventful recovery and was discharged seventeen days later.

Histologic Report by Dr. A. S. Price was: The specimen consisted of a large uterus measuring 15 cm. in length, 15 cm. across the fundus. Near the middle portion of the specimen, there was a cervical orifice about 2½ cm. in diameter. Imbedded in one wall of the cervix, and protruding below, was a tumor nodule about 10 cm. in diameter. The uterine cavity was found to be displaced to one side by a

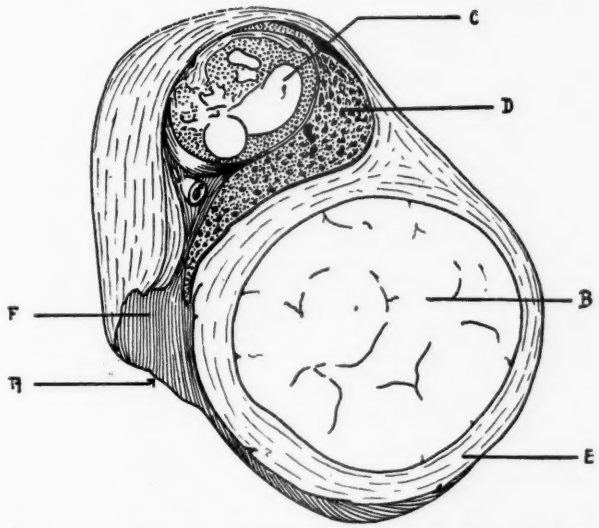

Fig. 1.—Sectioned uterus, showing relation of fibroid to pregnancy. *A*, Externalos; *B*, cervical fibroid; *C*, fetus; *D*, placenta; *E*, cervical wall; and *F*, cervical canal.

tumor nodule about 7 cm. in diameter found in the fundus. When the specimen was incised, the cervical tumor was hemorrhagic and degenerated. The tumor in the side of the fundus was hard, hyalinized, and showed small areas of necrosis. The fetus was apparently about four and one-half months of age.

Microscopic examination of the uterine muscle showed thinning, yet hypertrophy, of the muscle fibers. To the uterine wall were attached placental and chorionic elements. The endometrium showed a decidual reaction of pregnancy. The uterine tumors showed extensive necrosis, and one showed hemorrhage.

Diagnosis.—Degenerated fibromyomas of cervix and uterus complicated by pregnancy.

This case presents an object lesson as to the question of interference or the expectant plan in the treatment of fibroids complicating pregnancy. In view of the thinning of the wall of the uterus at the site of pregnancy, there is no doubt that the expectant plan of treatment would have resulted sooner or later in the rupture of the uterus.

THE USE OF A RUBBER BAND FOR TYING THE UMBILICAL CORD

GEORGE L. CARRINGTON, M.D., F.A.C.S., BURLINGTON, N. C.

BLEEDING from the umbilical cord of a newborn baby occasionally is difficult to control and is fraught with some danger to the baby as well as being the cause of considerable worry to the doctor and family. The umbilical cord, of course, shrinks somewhat during the early hours of life whereas the material ordinarily used to tie the cord does not contract correspondingly.

A very simple and efficient method consists in wrapping an ordinary small commercial rubber band around the cord. A band an inch and a half long can be wrapped around the cord six or eight times without difficulty. More than one band can be used, of course, if desired. Each strand of the band contracts as the cord shrinks, maintaining constant pressure of a considerable degree.

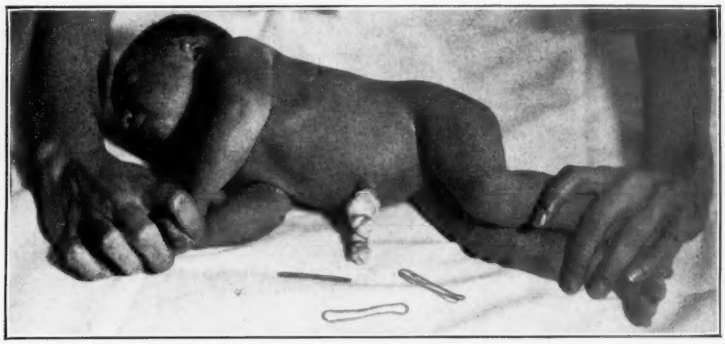

Fig. 1.—Newborn baby, showing dressing on umbilical cord and type of rubber bands used for winding around cord.

We have used this method for the past ten years and found it useful. The method is so simple, it has no doubt been used by others but I have not seen it mentioned. Our usual method of handling the cord has been to tie it with umbilical tape and then, following the late Dr. J. Whitridge Williams' idea of making the after-treatment of the cord as nearly fool proof as possible, we have wrapped a small alcohol gauze sponge about the cord, covering the end of the cord and leaving a little room near the abdominal wall to allow for folding the cord back under the belly band without exerting any pull on the umbilicus. Around this alcohol sponge we have wound the rubber band after the method that small boys once used on their football tubes. Fig. 1 tells the story.

Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D., CHICAGO, ILL.

THE AMERICAN COMMITTEE ON MATERNAL WELFARE, INC.

PROCEEDINGS OF MEETING HELD AT KANSAS CITY, MISSOURI, MAY 13, 1936

Chairman's Address—Dr. Fred L. Adair, Chicago

The Missouri Plan for Maternal Welfare and Child Care—Dr. Ralph R. Wilson, Kansas City

Maternal Mortality in Georgia During the Year 1935—Dr. Emmet D. Colvin, Atlanta

Abortion and Its Relation to Fetal and Maternal Mortality—Dr. Fred J. Taussig, St. Louis

Maternal Welfare Under the Social Security Act—Dr. Martha M. Eliot, Washington, D. C.

The North Dakota Committee on Maternal Welfare—Dr. John H. Moore, Grand Forks

CHAIRMAN'S ADDRESS

FRED L. ADAIR, M.D., CHICAGO, ILL.

THIS is in reality the second meeting of any size with a more or less formal program which has been held by our American Committee on Maternal Welfare. Those of you who were privileged to attend the last meeting learned something of the objectives of our committee and also heard about the plans which were being put into operation in various parts of the country:

Dr. A. J. Skeel told you of the plan in Cleveland which has worked so successfully there that it has been extending throughout the state and has passed over its borders to be adapted to the needs of other communities.

Dr. A. W. Bingham outlined the Organized Maternal Welfare Work in New Jersey, and this movement has been carried along with increasing momentum.

Dr. J. K. Quigley described the Maternal Welfare Work in New York which is being improved and augmented month by month.

Pennsylvania has moved forward rapidly in carrying out "The Plan of Action, Aims and Progress of the Pennsylvania Commission on Maternal Welfare" as outlined to us by Dr. James S. Taylor.

The interest in and the effect of the meeting in Atlantic City was so encouraging that it seemed very desirable to attempt a similar one in the Midwest at the time of the session of the A. M. A. The meeting today is the sequel at which other plans and ideas will be presented.

Since the last session two more organizations have been added to our list: The American Hospital Association and the National Organization for Public Health Nursing. Unfortunately an older society which was in reality the parent of this

organization has passed out of existence. I refer to the American Child Health Association which did so much to improve the welfare of infants and children in this country. The parent society is gone but many of its offspring continue, and among them is this organization of ours which is finding a definite field of activity and usefulness.

Since our last meeting the Social Security Act has become a fact and inasmuch as it contains in Title V provision for Maternal and Child Health Services it becomes of vital interest to us.

One of the important functions of our organization is to promote interest and activity in maternal welfare which can be accomplished only by and with that part of the medical profession which is concerned with maternity care. There is no other group of persons who can render this service to the mothers of this country, and both the doctors and laity must realize this fact. The former (physician) must supply the leadership and assume the responsibility; the latter (public) must supply the material, the institutions and the money, either through gifts, fees, insurance, or taxes.

Financial support must be forthcoming. The Federal Government and the States are now cooperating in plans which will assist enormously in this movement, especially so far as administrative organization and education are concerned.

There is still the most important step to be completed and that is the furnishing of services, especially by professional groups of doctors and nurses, so that every mother will receive adequate care during the antepartum, intrapartum and postpartum periods. This means complete maternal care in the home or in institutions, either by the private physician or by organized groups of doctors and nurses and in some sections by midwives.

Two of the fundamental concepts back of the activities of our committee have been that the interested doctors should assume the leadership which is inalienably theirs and that plans should be evolved in local communities which take cognizance of both the needs and resources of those communities. It is fully recognized that both advice or suggestions and financial assistance might be required. On the other hand, it must be realized that no community can permanently carry out successfully a plan for which it does not furnish the leadership and support. Individuals and communities must, in a large measure, ultimately pay in some way or other for the services which they receive or the plan cannot survive indefinitely.

It has been most gratifying to note the progressively increasing interest and activity on the part of physicians in some of the states in promoting maternal welfare. This is shown by the formation of state committees which are working in conjunction with the state medical societies and state boards of health in developing state-wide plans and in stimulating local medical societies to form committees to sponsor the programs for their own communities.

How much our American Committee has had to do with this progress is impossible to state, but it is, at any rate, gratifying to know that the purposes of our organization are gradually being developed as the result of some influences which are leavening the medical profession, the laity and other interested groups.

There have been many factors at work for some time and there have been many obstacles which are slowly being overcome. One of the highest hurdles is jumped when a proper understanding of motives and objectives is reached through the cooperation of the health departments, the medical profession and the laity.

There now seems to be a much better mutual understanding in many of the states than has heretofore existed, and there would seem to be no reason why a similar basis of activity cannot be extended to all of our states. There is no

reason why the state boards of health, cooperating with federal agencies, cannot furnish the necessary administrative machinery, financial assistance and some of the leadership in developing state-wide programs for complete maternity care. The medical profession and nursing organizations must furnish leadership, render service and carry out educational programs for doctors, nurses and the laity.

The state programs for maternal welfare have been, are being, and will be developed, adopted and put into effect by the various states. If interested groups of doctors do not bring the medical profession into the programs, it will fail because no plan not ultimately acceptable to and accepted by them can succeed as there is no other agency which can successfully carry on a comprehensive program of maternal care except those who are trained in the practice of obstetrics. The doctors, nurses, and the laity must work together in safeguarding motherhood to the detriment of none and to the benefit of all.

THE MISSOURI PLAN FOR MATERNAL WELFARE AND CHILD CARE

RALPH RUST WILSON, M.D., KANSAS CITY, MO.

INTRODUCTION

I. Explanation of name for plan
II. Conditions one year ago
  A. Practically virgin soil
  B. First efforts on part of Missouri State Medical Association to be interested in the field
  C. Average age of physicians in towns of 10,000 or less is 57.3 years
  D. State Board of Health
    1. Political appointees and an unstable organization
    2. Divergence of opinions to that of the State Medical Association in the years past
III. Appointment of Special Committee for study of Maternal Welfare and Child Care, May, 1935
  A. Constituency:
    1. Five practicing obstetricians
    2. Three practicing orthopedists
    3. President of Missouri State Medical Association, ex officio
    4. Executive-Secretary of Missouri Medical Association, ex officio
  B. Organization and Problems of the Special Committee
    1. Some plan of making the profession itself "maternal welfare conscious" (See Part I)
    2. Relationship to the State Board of Health with respect to Social Security funds (See Part II)
    3. Promotion of "lay" cooperation and education (See Part III)

In speaking of the title as it appears on our program, I wish distinctly to remove any inference that any of us here in Missouri working in maternal welfare have an original plan or program that is worthy of being copyrighted under such a name. As you well know, there was no especial interest in maternal welfare in Missouri until consideration of the Social Security Bill was brought before the American people, except for some interrupted work started by the American Legion. With that as a stimulus the Missouri State Medical Association in May, 1935, appointed a

special committee of five members to study the subject and bring in a report for the next annual meeting. The work of this committee has been entirely of the pioneer type; and, by the necessity of the time allotted and the lack of precedent to follow, that committee has borrowed freely from programs of cities, counties, states, national organizations and, in a few instances, foreign countries. I doubt that in the recommendations this committee offered at the state meeting there is a single original idea; it is merely a compilation and organization of efforts and plans used elsewhere.

I might add here that, following the report of the Special Committee on Maternal Welfare at the state meeting in April, 1936, the Association moved that such a committee be continued as a standing committee in the future. At least there appears to be rather favorable setting for such type of permanent work.

PART I

MAKING THE PROFESSION "MATERNAL-WELFARE CONSCIOUS"

I. Summary of Report of Special Committee:

In preparing the program for Part I, the Special Committee for the Study of Maternal Welfare was generously assisted by the State Board of Health. Some of the members of the Board of Health accepted invitations to each of the meetings of the Special Committee and the entire staff of the office of State Health Commissioner held their services open for requests.

A. Specific accomplishments thus far:

1. Changes in the standard birth certificates have been proposed and accepted by the State Board of Health (See appended blanks).

   a. Mode of delivery data
   b. Assistance to Committee on Crippled Children

2. A questionnaire form has been proposed and accepted by the State Board of Health to be used as the source of supplemental information in all cases of maternal deaths occurring in the state.

3. With the advice and consent of Dr. E. J. Goodwin, editor, a "Query Column" has been established in the *Missouri State Medical Journal* to be edited by members of the Maternal Welfare Committee.

4. A scientific exhibit was prepared and presented at the state meeting this year.

5. This same exhibit was presented to the American Medical Association for display at Kansas City in May, 1936.

6. A Missouri morbidity standard has been established as follows: "A puerperal case shall be considered morbid whose temperature runs a daily peak of 100.4° F. or above for three consecutive days excluding the first twenty-four hours."

7. Speakers on the subjects of various phases of maternal mortality have been furnished the following organizations during the year:

   a. The medical section of the Missouri Academy of Science
   b. The Missouri Public Health Association
   c. The Kansas City Southwest Clinical Society

8. The State Board of Health has been kind enough to furnish the Maternal Welfare Committee a duplicate report of all maternal deaths occurring in the state each month, for purpose of collecting data desired.

9. Each member of the committee has been assigned specific committee work as follows:

   a. Scientific exhibits
   b. The midwifery problem
   c. Criminal abortions
   d. Lay publicity
   e. Editor for the "Query Column"
   f. Legal problems

10. With the idea of establishing an annual custom, arrangements were made for a Maternal Welfare Committee Dinner at the state meeting. At this meeting members of the committee presented interesting cases of maternal deaths occurring in their own practice. Members of the Association who were known to have been so unfortunate as to have had maternal deaths were invited to sit in for this report and the subsequent comments.

11. By the consent and cooperation of the Program Committee and the officers of the State Association, a nationally known obstetrician, Dr. Joseph L. Baer, Chicago, was invited to give a critique of the presentations of the cases made at this dinner. All members of the Association, however, were welcome at both the dinner and the discussion thereafter by purchasing a ticket.

12. On the following morning Dr. Joseph L. Baer appeared as a guest speaker before the General Assembly, under the special auspices of the Committee on Maternal Welfare.

13. The membership of the Missouri State Medical Association has been surveyed and men throughout the state with special obstetric training or experience are classified in a reserve position to be used as auxiliary forces in carrying out special ideas or schedules.

B. Proposed objectives:

1. That the above program, as outlined, should be fostered and carried out so far as advisable and feasible for the next three years.

2. That the state be divided into territorial units; e.g., the Councilor Districts, for the purpose of unified investigations and approaches.

3. That the President of the Association appoint a special assistant from the respective Councilor Districts who is interested in obstetric problems in order to further any program or schedule.

4. That the Committee on Postgraduate Work assist the Committee on Maternal Welfare in establishing "refresher courses" and in doing extension work over the state.

5. That the Committee on Scientific Work assist the Maternal Welfare Committee in selecting one nationally recognized speaker for each Annual Meeting of the Association.

6. That there shall be the establishment of an annual award, although nominal in monetary value, for the best article appearing in the *Missouri State Journal* along the lines of maternal mortality during the year.

7. That some influence be established and popularized to promote the universal application of the Wassermann test on all expectant mothers.

8. That hospitals or institutions receiving referred cases from outlying districts be encouraged to separate maternal morbidity and mortality in those so-called "mussed-up" cases from those entering by regular routine.

9. That the Woman's Auxiliary of the State Association be approached and an attempt made to interest them in the activities of the Committee on Maternal Welfare.

10. That the Maternal Welfare Committee hold itself in constant readiness to provide State and Federal agencies with technical advice.

11. That the Committee cooperate so far as feasible and advisable with the American Committee on Maternal Welfare, Inc., in order to emphasize the significance of maternal mortality.

12. Assist Children's Bureau in the special study of stillbirths.

PART II

RELATION TO STATE BOARD OF HEALTH WITH RESPECT TO SOCIAL SECURITY FUNDS

I. Advisory Committee for the State Board of Health

A. Advisory Committee Personnel:

1. President of State Medical Association
2. President of State Dental Association
3. Representative of State Nurses Association
4. Representative of School of Medicine, Missouri University
5. Representative of School of Medicine, Washington University
6. Representative of School of Medicine, St. Louis University
7. Representative of State Tuberculosis Association
8. Representative of State Public Health Association
9. Representative of Missouri Association of Social Welfare
10. Representative of American Society of Pediatrics
11. Chairman of Maternal Welfare, State Medical Association

B. Duties of Advisory Committee:

1. Quarterly meetings with expenses paid
2. Aid in programs
3. Aid in future problems

II. Program for the State of Missouri Under the Social Security Plan

A. Objectives:

1. To benefit mothers and children in Missouri
2. To benefit physicians in Missouri
3. To promote lay education and principles of preventive medicine (all could have been directed to this end perhaps)

B. Agencies and Method of Administration:

1. Dispensation of Funds "A" and "B"
    a. By Missouri law such funds dispensed only through Department of Education
    b. Personnel responsible only to Division of Child Hygiene

C. Personnel of Staff:

1. Medical Director of the Division of Child Hygiene
2. Assistant Director of the Division of Child Hygiene
3. One full-time obstetrician (field worker)
4. One full-time pediatrician (field worker)
5. One full-time Public Health Director (field worker)
6. Three nurses with public health training
7. Auxiliary speakers to assist field workers

D. Field Program

1. Division of State into Working Units of:
    a. Councilor districts for purposes of:
        1. Future appointments
        2. Supervision of own work
    b. Local medical units, except urban territory

E. Specific Programs for Field Workers

1. Outline of subjects for Field Workers in Obstetrics:

a. The mechanism and management of normal labor
b. The toxemias of pregnancy
c. The usual complications of pregnancy, with special reference to pneumonia and intercurrent infections
d. Syphilis and pregnancy
e. The management of normal pregnancy
f. The minor ailments of pregnancy and prenatal care
g. Abortion, miscarriage and premature labor
h. Hemorrhage, both antepartum and postpartum
i. Pelvic measurements
j. The value of a complete physical examination early in pregnancy
k. Breech presentation and the method of its management, with special reference to its early diagnosis in labor
l. Forceps, versions and episiotomies
m. The management of occipitoposterior positions
n. Puerperal sepsis with special reference to contaminations by the attendants as well as exacerbations of patient's own infection
o. Cesarean section with special reference to the obstetric indication as well as the surgical facilities at hand
p. Contraception and sterilization with special reference to legal aspects, as well as medical technic.
q. Significant laboratory procedures in obstetrics
r. Hemorrhage and discharge in the nonpregnant

2. Outline for Field Workers in Pediatrics
3. Outline for Field Workers in Public Health Nursing
4. Outline for Field Workers in Dentistry
5. Outline for Auxiliary Field Workers

a. Duties of this group are largely one of educational lectures according to specific needs
b. Salaries are to be on "piece-work" basis

F. Rules governing Members of the Staff:

1. The Division of Child Hygiene does not practice medicine.

2. The staff members of the Division of Child Hygiene shall not enter into any argument concerning politics, administration of the State Board of Health, or policies of the State Board of Health. They shall, however, become familiar enough with the regulations of the State Board of Health that they shall be able to discuss intelligently questions pertaining to programs or policies.

3. Physician members employed by the State Board of Health must not only be reputable physicians with high professional qualifications but shall be members of the County, State and American Medical Association. They shall further become members of the State Public Health Association and the American Public Health Associations.

4. All members of the nursing staff shall be members of the State Nurses Association, and the National Organization for Public Health Nursing.

5. Each physician and nurse employed by the State Board must be licensed to practice medicine or nursing in the State of Missouri.

6. No member of the Staff shall obligate the State Commissioner of Health or any department head in any manner without first consulting the individual concerned.

7. In no case shall they directly or indirectly obligate the State Board of Health financially.

8. The staff members employed in the Division of Child Hygiene shall pay their entire travel and expenses from the amount allowed each individual for travel or expenses, and must in addition furnish any instruments or materials necessary in their work and not otherwise furnished by the State Board of Health.

9. The library of the State Board of Health is open to each staff member but any periodicals or books purchased by staff members shall be at their expense and will not be paid for from funds of the State Board of Health, unless so directed by the State Commissioner of Health.

10. Harmony among staff members is essential and petty bickering or personal gossip will not be tolerated. While in the field, whether during business hours or at other times, the employee is to remember that he is a representative of the State Board of Health and shall at all times so conduct himself. The State Board of Health will be largely judged by the type of personnel employed. The success of the administration of the Health Department will reflect credit upon the staff members and vice versa.

11. Comments or criticism heard in the field should be reported to the Division head who in turn will report such comment to the State Commissioner of Health.

12. Correspondence from staff members to the central office shall be addressed to Dr. E. T. McGaugh, Attention, Division of Child Hygiene.

PART III

RELATIONSHIP TO "LAY PUBLICITY" AND GENERAL PUBLIC EDUCATION

I. Responsibilities and Cooperative Duties of Missouri State Medical Association. (Incomplete to date.)

II. Responsibilities and Cooperative Duties of Missouri State Board of Health. (Incomplete to date.)

III. Responsibilities, etc., of Public Health Service. (Incomplete to date.)

IV. Responsibilities and Cooperative Duties of the Missouri Department of Education. (Incomplete to date.)

V. Reciprocation with Recognized Lay Health Organizations. (Incomplete to date.)

VI. Cooperation with Department of Extension Work of the University of Missouri. (Incomplete to date.)

SUMMARY

I. At the end of a year's work the Special Committee of the Missouri State Medical Association for Maternal Welfare has been made a permanent committee of five whose terms of office shall be three years—so staggered as to have two members retire each year to give place for two new members yearly.

II. The Missouri Plan of administering the Maternal Welfare funds has been accepted by the Children's Bureau.

III. Funds have already been received for the first year's work.

IV. The field workers are now spending a period of observation in preparation for active work to begin July 15, 1936.

V. A friendly relationship has finally come to exist between the Missouri State Medical Association and the Missouri State Board of Health.

VI. As yet, the plan can be submitted only in the form of a synopsis as the context will be derived from experiences encountered in its application. Thus, perhaps, before a final text is completed, it will have undergone many alterations.

VII. The State of Missouri has accepted the challenge of the high maternal mortality rates existing within her borders.

MATERNAL MORTALITY IN GEORGIA DURING THE YEAR 1935

E. D. Colvin, M.D., Atlanta, Ga.

DURING the past two years it has been my privilege and pleasure to serve as the chairman of a committee of twenty-one members appointed to study maternal mortality in the state of Georgia, and the following paper is made up of statistics from the committee's annual report to the House of Delegates of the Medical Association of our state.

A form similar to the ones used in the New York, Philadelphia, and the Fifteen States Survey was used in collecting the statistical data. Slight modifications of the questionnaire were made in order to meet conditions existing in our state.

On the tenth day of each month the Bureau of Vital Statistics supplied the committee with a copy of the maternal death certificates filed with it during the preceding month. Identifying information was copied from the certificates onto the questionnaires and these, accompanied by self-addressed and stampel envelopes in which they were to be returned, were immediately mailed to the attending physicians or midwives. If the attendant did not reply after several forms had been sent to him, one of the local district members of the committee then was requested to interview him. Thus, the committee was able to obtain its information before the details of the case had escaped the memory of the attendant.

It is not desired to overburden you with statistics, but a presentation of the following general information will give a rather definite idea of the relative importance of some of the factors which contribute to, and influence maternal mortality in our state.

During the year 1935, 60,424 live births were reported. Of these, 35,634 were whites and 24,790 were negroes. Physicians attended 35,701, and midwives attended 24,482 of these births. Of the 35,701 whites, 30,322 were attended by physicians and 5,201 by midwives. Of the 24,790 negro births, 5,379 were attended by physicians and 19,281 by midwives. A total of 3,968 stillbirths occurred during this same period. Of these, 1,524 were whites and 2,444 were negroes.

Sixty-seven per cent of the reported live births in the state occurred in rural districts. Midwives attended 39 per cent of the live births in the state. Physicians attended 81 per cent of the urban, but only 52 per cent of the rural deliveries.

The maternal death rate for the state during 1935 was 7.1 per cent per 1,000 live births. The infant mortality was 69 per 1,000 live births. Four hundred and thirty-eight maternal deaths occurred during the year, and the committee obtained answers to its questionnaires regarding 356 or 81.3 per cent of these mortalities.

CAUSES OF DEATH

Abortion was the cause of 53, or 14.9 per cent, of the fatalities. Seventy-nine per cent of these deaths were attributed to sepsis and constitute 38 per cent of the total number of deaths due to puerperal infection. Puerperal septicemia was the cause of 93, or 26.1 per cent, of the mortalities. Septic deaths following abortions will increase this figure to 41 per cent and place septicemia as the most frequent cause of death.

One hundred and twenty-three, or 34.5 per cent, of the mortalities were due to the toxemias of pregnancy. One hundred and sixten, or 32.6 per cent, of the total

number of deaths were due to eclampsia. Seventy-three per cent of the women dying of eclampsia were not attended by a physician prior to the onset of convulsions. Twenty-three, or 19 per cent, of the eclamptic patients died undelivered. Forty-five per cent delivered spontaneously and 34 per cent were delivered by operative procedures. It was found that the onset of labor was spontaneous in 62.9 per cent of the women dying of this condition. Fifty-five per cent of them died without the benefit of hospitalization.

Hemorrhage, including placenta previa, abruptio placentae, and postpartum bleeding claimed 14.9 per cent of the mortalities. The accidents of labor accounted for 2.6 per cent. Hyperemesis, ectopic gestation, and diseases incidental to pregnancy make up a small percentage of the total fatalities in the study.

DISTRIBUTION OF DEATHS AMONG WHITES AND NEGROES

One hundred and eighty-eight, or 52.8 per cent, of 356 deaths were among white women. Evidently the presence of a large negro population in the state is not the factor responsible for our increased maternal mortality rate, as we have so often thought.

Deaths following abortion were higher among colored than among white women. The percentage of deaths due to hemorrhage was twice as high among whites as among negroes. Deaths due to sepsis, eclampsia, and other causes were approximately equally divided between the two races.

The incidence of illegitimate pregnancies was 3.5 per cent among whites and 11.5 per cent among negroes.

PRENATAL CARE

After excluding those women who died from ectopic pregnancies and abortions, there remained 294 who might have received prenatal care, but 68.3 per cent of them died without the benefit of prenatal supervision. Seventeen per cent were credited with having received adequate care, and 14 per cent of them had inadequate or poor care.

PARITY

Primigravidas made up 173, or 48.6 per cent, of the mortalities. The percentage of deaths due to abortions, ectopics, and hemorrhages was more than twice as great among multiparous women. Deaths due to septicemia were 9 per cent higher among the multiparas. Albuminuria and eclampsia caused 52.5 per cent of the mortalities among the primigravidas.

PERIOD OF GESTATION

Two hundred and eighty-two, or 76 per cent, of the fatalities occurred in women who had reached the third trimester of pregnancy. Death occurred during pregnancy in 8.4 per cent; during labor in 4.8 per cent; and 86.8 per cent died during the puerperium.

OPERATIVE DELIVERIES

These are factors of great importance in the etiology of present-day obstetric mortality. Of the 282 women who died in the third trimester of pregnancy, 34 per cent had had some form of operative procedure directed toward delivery. Twenty-five deaths occurred after cesarean sections had been performed; 44 women died following forceps delivery; 29 died after delivery by version and immediate breech extraction; and 5 deaths followed breech extractions. It was found that 32.5 per cent of the patients with albuminuria and eclampsia were delivered by operative procedures.

The increasing use of various anesthetic agents which so often interfere with physiologic labor and necessitate a greater operative interference is a rather constant contributory factor in the cause of increased maternal mortality. But anesthesia was a small factor in the causation of maternal mortality in our state during the year covered in this survey. Of the 282 women delivered during the third trimester of pregnancy, 41 per cent did not receive any form of anesthesia. Chloroform was the anesthetic of choice among rural practitioners. Three women died as a result of spinal anesthesia before the contemplated cesarean sections could be started.

METHOD OF ONSET OF LABOR

The onset of labor was spontaneous in 255, or 89.9 per cent, of the women who were in labor during the third trimester of pregnancy. The catheter method was the one most often employed in the induction of labor. Of the patients who were suffering from toxemia, 62.9 per cent developed convulsions prior to or after labor had started spontaneously.

PLACE OF DELIVERY AND PLACE OF DEATH

Only 45.8 per cent of the women who died had had the advantage of hospitalization. Of these, 39.1 per cent were rushed in as emergencies or were in a moribund condition at the time of admission.

INFANTS

From the 282 women reaching a stage of fetal viability, 187 infants were delivered alive. Seven sets of twins and one set of triplets are included in the series.

ATTENDANT AT DELIVERY

Midwives alone attended 19.3 per cent of the fatalities, and in 25.3 per cent they were relieved by physicians after complications had developed. Therefore, midwives contacted 44.6 per cent of the mortalities. Physicians alone were credited with having attended 50.5 per cent of the deaths. During the year covered in this survey, midwives attended 24,482, or 40.5 per cent, of the live births reported in the state of Georgia.

In conclusion, after reviewing the records of 356 maternal deaths, we cannot deny that our maternal mortality should be greatly reduced. It is an outstanding fact that there is a need in rural communities for prenatal care and supervision during delivery—a service which does not exist at this time. It is a mutual problem of the laity and the medical profession. Until organized medicine appreciates the importance of maternal mortality, and until we realize its cause, it is of little use to appeal to the public for its cooperation. Too often we, as physicians, are unwilling to accept the blame for a large number of maternal deaths which studies have shown to be preventable or controllable. An example of this is illustrated by the frequency of failure on the part of physicians to appreciate the signs, delay in reaching a diagnosis, and postponement of definite measures in terminating pregnancy among patients suffering from fulminating toxemias. In this study, many cases were presented in which a preeclampsia, treated expectantly, was permitted to develop into eclampsia. In contrast to these, there are a number of physicians who practice radical procedures and continue to treat extremely ill toxic patients by operative procedures, illustrated by emergency cesarean sections on women suffering from eclampsia.

Too often there is a lack of understanding of just what is meant by prenatal care. To be able to render prenatal care, a physician must not only understand it, but he must be willing to render it conscientiously.

Much blame can be placed upon the public for its failure to apply for and cooperate in prenatal care. Over two-thirds of our deaths occurred among women who had not been attended by a physician before he was called to treat the pathologic conditions which claimed their lives. The profession must be willing to instruct and guide the public by continually and persistently giving advice in all matters pertaining to pregnancy. This advice would be especially valuable in controlling deaths due to abortions and toxemia.

The profession alone, without the cooperation of the laity, can make very little progress in decreasing maternal mortality in our state. The public must be advised and it must be strongly urged to cooperate in this problem of such vital interest to it. If it is possible to reduce the number of deaths due to abortions and improperly handled toxic conditions, the death rate for the state will be greatly reduced.

Economic conditions have caused the bulk of rural maternity work to be thrust into the hands of the midwife. It is the duty of the medical profession to demand that the type of her training and the quality of her work be improved. Also, adequate supervision of her work is of paramount importance.

The medical profession of the state cannot undertake to change the economic system, nor are they in a position to bring about a change in the general level of intelligence throughout the state. Ignorance, superstitions, and illiteracy continue to handicap scientific efforts. However, in the interest of the advancement of preventive medicine it is the duty of the profession to undertake to eliminate those factors not of a medical character which increase maternal mortality. Once the cooperation of the public is obtained and a system of maternity service instituted, the death rate from eclampsia alone should be reduced 50 per cent. It is alarming to learn that this almost preventable disease was the cause of 30 per cent of the maternal deaths in the state of Georgia last year.

1040 Ponce de Leon Avenue, N. E.

ABORTION AND ITS RELATION TO FETAL AND MATERNAL MORTALITY

FRED J. TAUSSIG, M.D., ST. LOUIS, MO.

ABORTION is, I believe, the greatest single factor in fetal and maternal mortality. This is evidenced by the fact that approximately one out of every four or five conceptions terminates in fetal death through abortion and that two out of every five maternal deaths can be ascribed to an abortion. From the available data, in spite of uncertainties, I am convinced that this statement is not far from the truth.

Let me explain briefly how I have arrived at these figures. There is a difference between a guess and a careful estimation. You have doubtless all had occasion at some time to guess at the number of beans in a gallon jar. If, however, you have taken the problem seriously and carefully measured the jar capacity and the size of the bean, the answer should closely approximate the actual number. The same principles apply in the calculation of total abortion deaths. If, in addition, we seek independently the abortion death rate and find that the estimated number of abortions times the estimated death rate tallies approximately with the estimated abortion deaths, I think you will agree that we are near the actual figures. And I think it is of considerable importance for us to visualize this approximate truth instead of assuming an agnostic attitude as some do, or accepting the wild exaggerations that are so frequently made by propagandists.

First as to the number of abortions: Hospital and dispensary figures quite evidently record but a small proportion of the total abortions since so large a number are done secretly without record of any kind. While anxious to conceal the fact of an abortion at the time it occurs, it is the general experience of physicians that women are surprisingly frank in giving information concerning past abortions. From such statements the ratio of abortions to confinements can be estimated. From Dr. Kopp's study of records in New York maternal health centers, there were found to be 11,172 abortions to 27,813 confinements, a ratio of 1 to 2.5. This corresponds to smaller statistics obtained from other urban sources. In the rural districts this abortion-confinement ratio from the figures collected by Plass approximates more closely 1 abortion to 5 confinements. Dividing the 2,400,000 annual births according to the U. S. Census estimate of 42 per cent urban and 58 per cent rural, we arrive at the figure of 681,000 abortions annually in the United States. Let us call this 700,000 abortions, add to this 100,000 stillbirths (figured at 4.2 per cent of the live births) and then the 2,400,000 live births, we arrive at a total of 3,200,000 conceptions of which 700,000 terminate in abortion, or approximately one in four or five conceptions.

Equally troublesome is the estimation of maternal deaths from abortion. The recorded abortion deaths as given in the Census reports are certainly incomplete, since there is ample evidence that a very large proportion of abortion deaths are intentionally concealed for fear of exposure or possible legal entanglements. On the other hand, let it be clearly understood that practically without exception *every death is* somewhere *on record* in our mortality statistics, even though a different diagnosis may be put on the death certificate. The problem is to find under what head these additional abortion deaths might be concealed. The actual correctly recorded abortion deaths for the years 1930 to 1932 averaged 2,740 for the regis-

tration area of the United States or about 3,000 for the entire country. The splendid study of New York maternal mortality made under the auspices of the New York Academy of Medicine with check-up of all cases by personal interview and hospital records showed that in 56 out of 357 maternal deaths from abortion no mention of abortion was found on the death certificate. There was thus an error of one in every six death certificates. Let us keep clearly in mind that these were all recorded as pregnancy deaths but not as abortion deaths. If we apply this addition of one-sixth to the total of about 3,000 registered abortion deaths, we get 3,500 as the approximate number that can be included under this head.

And now to come to the search for abortion deaths classified under other heads: In the monograph on abortions* I call attention to an interesting suggestion made by Freudenberg in studying abortion mortality in Prussia. He found that the figures for abortion deaths by some writers almost equalled the total deaths for all women of fertility age. As a check-up on these wild statements he made a comparison of the causes of death in men and in women in the fertile period between fifteen and forty-five years. Where there was an evident discrepancy in favor of the women, as under the head of lung, cardiac and genitourinary diseases, one-half of the total was roughly estimated to be due to concealed abortion deaths. In this way the number of abortion deaths registered under puerperal causes was found to be about one-half of the total. I have attempted a similar comparison between male and female deaths from the U. S. Census reports for 1930, 1931, and 1932, occurring during the period of fertility (fifteen to forty-five years), and the estimated ratio of concealed abortion deaths tallies closely with the figures obtained by Freudenberg.

Under some heads, such as tumors, malformations or certain infectious diseases, the likelihood of misstatement is remote. In other groups there was no apparent discrepancy from the average of 10 male to 8 female deaths. Striking differences were, however, found under the head of:

List No. 129: Peritonitis, cause not specified (1930-32): male 549; female 1004; an average surplus of 152 women per year.

List No. 125a: Yellow atrophy of the liver (1930-32): male 189; female 482; an average surplus of 98 women per year.

In the larger groups we also found a discrepancy under the head of:

List No. 23: Tuberculosis, respiratory system (1930-32); average discrepancy of 3,035.

Group VII. Diseases of the circulatory system (1930-32); average discrepancy of 2,064.

List Nos. 130-131: Acute and chronic nephritis (1930-32); average discrepancy of 1,774.

The total discrepancy from these three causes of death was 6,873. If we assume that one-half of this discrepancy might be due to concealed abortion deaths we would have 3,437 additional deaths.

If now we add all these concealed deaths to the 3,500 previously referred to under the head of pregnancy, we find that the approximate corrected annual deaths from abortion in the continental United States amount to 7,187. Even supposing that we had failed to include a few abortion deaths concealed here and there under other heads, it is inconceivable to me that the total number could greatly surpass 8,000 annually. This would seem a maximum figure.

The average death rate from abortion taken from large hospital and dispensary figures here and abroad is 1.2 per hundred. The sources of this estimate are given in a previous publication. With improved technic of physicians and abortionists,

*_Abortion, Spontaneous and Induced, Medical and Social Aspects_, St. Louis, 1936, The C. V. Mosby Co.

with a decrease in the number done by midwives and patients themselves, this rate is probably a little too high. At any rate we see that the number of estimated abortions (700,000) times the death rate comes very close to the estimated total of abortion deaths (7,187).

Turning now to a comparison of abortion deaths with those following childbirth, we find that the number of registered deaths following pregnancy, childbirth and the puerperal state for the years 1930 to 1932 averaged 14,156. If we deduct from this number the 3,500 abortion deaths registered under this head and about 600 due to ectopic pregnancy, we have approximately 10,000 deaths at confinement compared with about 7,000 abortion deaths, a ratio of 3 deaths from childbirth to 2 deaths from abortion.

So much for the numerical evaluation of abortion as a factor in fetal and maternal mortality. Now a word as to what can be done to prevent this enormous waste of human life: Practically we cannot weigh in the same balance the life of a two-month embryo and the fully developed life of the young mother. Nevertheless the loss of these embryos occurring by the thousands is a serious handicap to the work of the world. It interrupts the important obligations of the mother to her family, it is a serious financial burden, and often leads to partial or even complete disability of the women who have aborted. Nowhere is the ounce of prevention more clearly needed, and this ounce of prevention means the prevention of the undesired or undesirable pregnancy. More widespread information concerning birth control, and better and simpler methods of preventing conception are indispensable to accomplish this end. This would, of course, apply only to the induced and therapeutic abortions comprising together about 70 per cent of the total. Concerning the prevention of spontaneous abortion (the remaining 30 per cent) much has been written and, especially with our increasing knowledge of endocrine pathology, methods of treatment have shown considerable improvement. Physicians either through carelessness or ignorance are frequently remiss in their efforts to hinder a spontaneous abortion. A fuller appreciation of the underlying causes tending to faulty development or premature expulsion of the fetus would result in a definite lowering of the abortion rate. Fetal deaths due to syphilis in the middle trimester of pregnancy could, under proper supervision, be reduced to a very small number. Indeed there is more hope of accomplishment in the prevention of spontaneous abortion than in the larger group of induced abortions in which the physician must cope with a change in underlying social conditions and economic distress.

Coming now to the seven to eight thousand maternal deaths, we must realize that the underlying cause in the larger group of induced abortions is that the illegal operation is usually done under conditions predisposing to infection by a person untrained in surgical technic. The Russian legalization of abortion, quite regardless of how it may have stimulated an increase in the actual number of abortions, has demonstrated that the abortion mortality can be reduced from about 1 per cent to almost one hundredth of that amount by rigidly restricting its performance to qualified physicians working under hospital conditions. Whether a broadening of the indications for abortion is a step in the right direction is worthy of careful consideration. Such a change should primarily be concerned with the relief of the depleted pluriparous mothers of the poor.

Of more immediate concern to the physician is the proper handling of the infected abortions, whether spontaneous or induced. The analysis of maternal mortality made through the Children's Bureau has shown the large part played by the curette in the spread of these infections. Only too often an infection introduced by the instruments of the patient, midwife, or abortionist into the uterine cavity, is carried into the blood stream by the operative zeal of the well-meaning, but poorly

trained, physician. Perforation of the uterus is another unfortunate accident only too common under such conditions. With but few exceptions we must advise a "hands-off" policy in the presence of acute infection.

While we are here concerned primarily with problems of mortality, we should not leave out of consideration the very serious and widespread morbidity resulting from this scourge of abortion. It was a realization of these sequelae that largely induced the Russian government to restrict its policy of legalized abortion. Such women are likely to develop in subsequent pregnancies serious complications such as ectopic gestation, adherent placenta, and difficult labors. In other ways their general health and constitution may be undermined by repeated abortions.

If I have been pessimistic in thus presenting to you the wastage of maternal life and health through the widespread prevalence of this practice of abortion, let me add that I am rather optimistic as to the future. This is based upon the following changes that have recently become manifest:

1. A franker facing of the problem of abortion in medical and sociological writings.
2. Better understanding of the causes of spontaneous abortion and its prevention.
3. The awakening of social consciousness, especially in regard to maternal welfare among the poor.
4. Gradual elimination of the untrained midwife.
5. Widespread information concerning birth control and better methods of preventing conception where pregnancy is not desired or is contraindicated.
6. Better training by physicians in the handling of abortion cases. These changes have, however, only just begun. We must do all in our power to hasten their development.

THE NORTH DAKOTA COMMITTEE ON MATERNAL WELFARE

JOHN H. MOORE, M.D., F.A.C.S., CHAIRMAN, GRAND FORKS, N. D.

THE North Dakota Committee on Maternal Welfare is very young. Time will give it maturity without, I hope, diminishing its enthusiasm. It was conceived by the American Committee on Maternal Welfare, Inc., and born by the North Dakota State Medical Association. We trust that neither parent will have occasion to disown its offspring.

We were appointed as one of the regular committees of the North Dakota State Medical Association in November, 1935. Our first major objective was the sponsoring of as many obstetric meetings before the component District Medical Societies of the State as time would allow. Every committee member was assigned a topic and everyone accepted his subject and went to work. The purpose was not merely to present obstetric programs in a hit-or-miss manner but to present a symposium on obstetrics, dealing with the major causes of obstetric deaths. Infections, toxemias, and hemorrhage are the major causes of maternal deaths in North Dakota, just as they are elsewhere.

One of our committee took as his subject, "Maternal Mortality in North Dakota." With access to the files of the Bureau of Vital Statistics, he was able to present the figures for our own state in a convincing manner. I would not have you believe, from this, that North Dakota has a high maternal mortality. On the contrary, it ranks with the best in the country, but our neighbor, Minnesota, with the best record in the nation, has given us a tangible goal to reach, and we are out to equal or better her record!

Emphasizing the importance of the Maternal Mortality Triad, we usually present three papers at each district meeting. Discussion is based on the papers as a symposium after the formal presentation of all of them. We have found that this is by far the best way to provoke discussion. Informal case reports, based on one of the triad, invariably come to light and the discussion is general, active, and helpful. On one occasion it lasted for one hour and in another meeting for one hour and thirty minutes. When obstetric programs can provoke discussions for that length of time, they are fulfilling a very large part of their mission.

This plan of district meetings has met with the splendid cooperation of the officers of the various societies contacted. It has been more a question of finding time to put on all the programs requested than of creating a demand for them. Since January, 1936, when the committee first began to put on these programs, we have appeared before five district societies. At the present rate of progress, it will take us more than a year to fill all the remaining requests for meetings.

It is obvious to us that our State Committee can function best only as a directing agency and as a clearing house and that the most effective work will be done by the district societies. To further this, we are asking that each district society appoint a subcommittee on maternal welfare. We recommend that each subcommittee consist of three physicians, at least one of whom shall be a rural practitioner. We expect such subcommittees to: (1) Sponsor obstetric programs in their own societies at stated intervals. (2) Encourage case reports in obstetrics by the society members. (3) Foster educational work among lay organizations such as Federated Women's Clubs, Parent-Teachers Organizations and Home-Makers Clubs.

Other activities of such committees naturally suggest themselves, but it has seemed wise not to burden these committees with too extensive a program at the

outset. If those three objectives can be attained, we feel that much will have been accomplished in the campaign for better obstetrics.

I would call your attention to the fact that North Dakota is one of 17 states in the Union requiring an interneship before a license to practice is issued by the State Board of Medical Examiners and that this rule has been in effect since 1918. It is thus evident that our physicians have had rather better than the average medical training. Our state has, predominantly, a rural population and everyone knows the difficulties surrounding the man with a large rural practice dependent upon him when he attempts to find time for postgraduate instruction. In most instances, finances and the demands of his practice will not permit it.

We feel that if postgraduate instruction is to be made available to our physicians, it must be brought to them. To this end, preliminary arrangements are now under way to hold at least 3 or 4 two-day obstetric seminars during the year. The plan is to have this seminar conducted by some prominent obstetrician from out of the state. We have arranged with 3 District Medical Societies to sponsor such seminars and hold their regular evening meeting on the closing night of the sessions at which time the visiting clinician will be asked to address the society and its guests. The chief subjects to be discussed in this seminar are: (1) Prenatal care, (2) the prevention of infection, (3) the prevention and control of the toxemias of pregnancy, (4) the prevention and management of abortions, and (5) breast feeding. Members of our committee will be ready to assist in the clinics and discussions if requested to do so by the host society, but we are again placing the emphasis where we think it belongs—on the district society.

This will be a very modest beginning in the matter of postgraduate instruction, but we feel confident that the success of our first seminar will create a demand for similar seminars or "refresher" courses on a larger scale and that eventually they will be in demand throughout the state.

I cannot leave the subject of professional education without acknowledging with gratitude the splendid cooperation our committee is receiving from Dr. Maysil M. Williams, State Health Officer for North Dakota. Through her department, sterile obstetric packages are to be made available to private physicians requesting them for home deliveries. With the endorsement of the committee and under the direction of Dr. Williams, a Maternity Nursing Service is to be instituted in one county in the state for a period of one year. We will watch with great interest the work of this Nursing Service.

The committee has stressed the importance of well-equipped, separate obstetric departments in hospitals admitting maternity patients, adequate nursery facilities, and the importance of the isolation of any infected patients. Our hospitals in the larger centers have an excellent rating in these vital points. We have somewhat of a problem in some of the small so-called "maternity homes." These are often nothing more than private dwellings, admitting two or three women for care during labor and the puerperium. The State Board of Administration which licenses all hospitals and maternity homes in the state will be asked to check all so-called "maternity homes," especially in regard to equipment and whether or not registered nurses are in charge.

We entered the field of lay education via radio. The committee prepared a series of eight radio talks, each fifteen minutes in length, and they were broadcast weekly under the name of the North Dakota Committee on Maternal Welfare by Dr. H. E. French, Dean of the Medical School of the University of North Dakota and Chairman of the Committee on Medical Education of the North Dakota State Medical Association. The committee desires to express its thanks to Dr. French for his cooperation in making these broadcasts possible. Subjects presented were: "Prenatal Care," "The Hygiene of Pregnancy," "Diet and Exercise in Preg-

nancy,'' ''Mode of Living for the Pregnant Woman,'' ''Common Disorders of Pregnancy,'' ''Danger Signs of Pregnancy,'' ''Puerperal Infections,'' and ''The Toxemias of Pregnancy.'' Because of the response to this feature of lay education, it was decided to prepare and broadcast a series of four talks on Infant Welfare. The subjects to be covered are: ''The Newborn Infant,'' ''Breast Feeding,'' ''The Infant in the First Few Months of Life,'' and ''Immunization.''

Every radio program must have a ''radio signature'' or a ''theme song.'' Ours is ''See Your Doctor!'' Throughout all our talks we have repeatedly urged the importance of the personal relationship between patient and physician. We have not attempted any ''question and answer'' department, any advice by mail or any of the other follow-up procedures usually associated with radio broadcasting. If we have succeeded in awakening any public interest in the field of maternal welfare, we have obtained our objective and the patient and her private physician are the beneficiaries.

Home-Maker Clubs are very active in North Dakota. They are well organized and interest in them is high. Regular courses of study are followed and the assignments are made well in advance of the scheduled meetings. Our committee was approached by the State Department of Health as to the possibility of providing a course of study, dealing with maternal and infant welfare, for Home-Maker Club meetings. The response of the committee was unanimously in favor of such a plan, and we expect to assist in the preparation of such a course of study in the very near future.

Whatever may be our individual attitudes toward Social Security Legislation, I believe we all realize that, in some form or other, it is here to stay. The attitude of the medical profession in North Dakota, as I have been able to determine it, is decidedly against socialized medicine. The first thing our committee did was to assure our medical audiences that our program was the antithesis of state medicine or socialized medicine in any form. When our physicians understood that, in our program for maternal and infant welfare, we were representing organized medicine in North Dakota and that we were a regularly appointed committee of the North Dakota State Medical Association, cooperation supplanted whatever skepticism might have been present.

As our committee sees it, our problem is to develop its state program along lines which will increase the prestige of the individual practitioner of medicine and bring our influence to bear with state health officials to further that end. We have stressed and will continue to stress, both to medical and lay audiences, the personal relationship which must exist between patient and physician to improve the standards of obstetric practice. All the members of our committee are men engaged in the private practice of obstetrics and/or gynecology. Doctors in North Dakota are highly individualistic and I, for one, hope that they remain so. It is not regimentation we are looking for but cooperation. I believe that our influence, as a committee, will be felt in the development of state plans for maternal and child welfare in North Dakota. I have indicated some of the projects under way and some of our plans for the future. We believe that only through the cooperation of the physicians of the state and the education of the patients to seek the highest type of obstetric service available to them can this, or any other, program of maternal welfare succeed. We are cooperating with the Public Health Officer in planning and supervising a program of maternal and child welfare, and we are doing so as private practitioners. If we can continue the cordial relationships now being established between organized medicine on the one hand, and a rapidly developing state plan for maternal welfare on the other, our efforts will succeed. The response to date has made us optimistic for the future.

American Journal of Obstetrics and Gynecology

EDITORS: GEORGE W. KOSMAK, M.D., AND HUGO EHRENFEST, M.D.
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Editorial Comment

The Induction of Premature Labor in Contracted Pelvis

THE induction of premature labor for moderate degrees of pelvic contraction is one of the deep-rooted traditions of British obstetrics. It dates, as Denman points out, from about 1756 when a group of London physicians, seeking a substitute for craniotomy in cases of contracted pelvis, met "to consider of the moral rectitude of, and advantages which might be expected from this practice." There can be no doubt that the contributions of British obstetricians to this general field have had far-reaching and beneficial effects. Today the induction of premature labor is recognized the world over as a valuable measure in the treatment of many obstetric conditions. Oddly enough, however, its use in the complication it was originally designed to serve, contracted pelvis, is at present confined almost entirely to Great Britain.

Recent evidence suggests that even in Great Britain opinion is veering away from this practice. There appears in the September, 1936, *Proceedings of the Royal Society of Medicine* a significant symposium on the motion, "That induction of premature labour should not play any part in the treatment of contraction or disproportion in primigravidae." Seventeen leading obstetricians discussed the proposal and the majority (10) favored the motion, that is, opposed the induction of labor for contracted pelvis. Their statements were based on series of cases from various English hospitals and referred in most instances to inductions brought about by means of bougies. During the discussion even the advocates of the method conceded a fetal mortality of 12 per cent, or more. Induction of premature labor in primigravidas at King's College Hospital resulted in a stillbirth rate of 20.8 per cent. At St. Thomas's Hospital and the General Lying-In Hospital, York Road, the infant mortality following the same measure was 16.5 and 17.5 per cent, respectively. Uterine inertia and infection were not infrequent sequelae. At the Middlesex Hospital, where labor was induced prematurely in 44 primigravidas because of disproportion, uterine inertia occurred in 38 per cent. The induction of premature labor at the King's College Hospital increased the forceps rate no less than threefold, while 45 per cent of the patients showed definite evidence of uterine infection after delivery.

That certain British obstetricians have definitely abandoned premature induction of labor in contracted pelvis, seems clear. Of interest to

American obstetricians is the fact that this reversal of attitude is said to be the result of a statement made by the late Dr. J. Whitridge Williams when he visited England in 1925. Since 70 to 80 per cent of all labors complicated by contracted pelvis end spontaneously if treated expectantly, Williams held that the induction of premature labor is rarely justified and that in cases of moderate pelvic contraction equally good results for the mother, and far better results for the child, are obtained by abstaining from it, and subjecting to cesarean section at term all patients who present such disproportion as makes a spontaneous outcome unlikely. The principal difficulty connected with the induction of labor in such cases, he pointed out, is to recognize those which will require it, and to choose the correct time for its performance. Failing to do these things, and it is utterly impossible to carry them out with precision, two pernicious results will ensue. On the one hand, many patients will be induced unnecessarily, while on the other, certain women will fail to deliver even premature infants. In the latter instance the patient has obviously been rendered unfit for cesarean section by the instrumental induction and both her life and that of her child placed in jeopardy. In the recent symposium, Mr. A. J. Wrigley cites evidence to show that in England "over the last few years thousands, possibly tens of thousands, of unnecessary inductions have been performed."

But it must be emphasized that the verdict of the symposium was not unanimous. Seven of the seventeen obstetricians supported the induction of premature labor and adduced evidence to show that the fetal mortality of this procedure is no higher than that of trial labor. They rightly feel that "the operation of caesarean section is treated much too lightly and performed far too often" in moderate degrees of contracted pelvis. Again Williams' name comes into the discussion but now unfavorably as the sponsor of the "anti-induction school of thought" in England. He is criticized in particular by Dr. Herbert Spencer on the grounds that "Professor Whitridge Williams' personal experience of induction for contracted pelvis was limited to one case." For some thirty-five years Williams' principal clinical interest was the course of labor in contracted pelvis and few other men have had the opportunity to observe such rich material in this field. The induction of premature labor for certain complications of pregnancy he, of course, practiced frequently. Moreover, as his textbook shows, he had weighed carefully the results of this procedure in contraction of the pelvis, as reported by Kleinwächter, Pinard, Bar and others and, in brief, found them inferior to those obtainable by other methods. With such a background "one case" might prove ample.

If the premature induction of labor for contracted pelvis is losing ground in England, the change will be watched with interest in this country. Certainly, it is one of the few subjects on which American obstetricians could take serious issue with their British colleagues.

Nicholson J. Eastman.

Society Transactions

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF OCTOBER 1, 1936

The following papers were presented:

The Primiparous Internal Genitalia After Forceps Delivery. Dr. Fred B. Nugent. (For original article, see page 611.)

Use of Parathyroid Extract for the Control of Early Nausea and Vomiting of Pregnancy. Dr. Walter Sussman. (To appear in a subsequent issue.)

The Incidence of Ureteral Stricture in Lower Abdominal Pain in Women. Dr. Charles Lintgen. (For original article, see page 636.)

BROOKLYN GYNECOLOGICAL SOCIETY

MEETING OF APRIL 3, 1936

The following papers were presented:

The Diagnostic Value of the X-Ray in Placenta Previa. Drs. S. C. Hall, F. W. Currin and J. F. Lynch. (For original article, see page 625.)

MEETING OF NOVEMBER 6, 1936

The following papers were presented:

Abdominal Pregnancy. Diagnosis Confirmed by Hysterography. By Dr. A. Louis Friedman. (For original article, see page 683.)

A Report on Radiation Treatment of Cancer of the Corpus and Cervix Uteri. By Dr. William S. Smith. (For original article, see page 596.)

Congenital Atresia of the Esophagus With Tracheo-Esophageal Fistula. By Dr. Alexander R. Rosenthal. (For original article, see page 646.)

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D.

Selected Abstracts

PLACENTA

Frey and Forster: Uterine Contractions in the Placental Period, Ztschr. f. Geburtsh. u. Gynäk. **107:** 311, 1934.

With the aid of the hysterotonograph, a new instrument for registering both contractions and tonus of the uterus, it is convincingly shown that the expulsion of the fetus is not followed by a rest period of uterine activity as heretofore assumed. The first contraction of the placental stage begins anywhere from a few seconds to three and one-half minutes after expulsion of the child. The frequency of the contractions averages 3.5 per ten minutes. The placental period was terminated by 6 to 10 contractions in 95 per cent of all patients; only a very small percentage required from 11 to 15 pains; 75 per cent were ended with 5 contractions.

The expulsion of the child is followed immediately by a marked decrease of uterine tonicity. Both the duration of each contraction and the tonicity of the uterus are important factors in the time necessary to conclude the placental stage.

Blood loss is dependent upon the number of contractions necessary to end the placental stage. It amounts to only 100 gr. or less when only few contractions are required.

GROVER LIESE.

Scheibel, O.: The Influence of Pitocin on the Delivery of the Placenta, Acta obst. et gynec. Scandinav. **15:** 211, 1935.

The author found that in a series of 300 primiparas 11 per cent lost more than 400 gm. of blood. He administered 5 units of pitocin in 300 other women and ascertained that only 4 per cent of these women suffered a similar loss of blood. No untoward complications were observed from the use of pitocin.

J. P. GREENHILL.

Kraistensen, B.: Manual Detachment of the Placenta and Intrauterine Palpation, Acta obst. et gynec. Scandinav. **15:** 165, 1935.

Previously intrauterine manipulations after delivery were considered to be dangerous. Recent experience, however, has convinced Kraistensen that these dangers have been exaggerated. To prove this he collected the cases of intrauterine manipulation in the Maternity of the Copenhagen State Hospital from 1924 to 1933. He found that among 16,137 labor cases the uterus was invaded 208 times. Analysis shows that intrauterine manipulations were dangerous only in patients who were infected or markedly anemic. The author advises exploration of the uterus for removal of a placenta as early as possible. In uncomplicated cases the risk is slight.

J. P. GREENHILL.

Cuilla, A.: The Arterial System of the Placenta, Folia gynaec. Demograph. **31**: 641, 1934.

By using x-ray opaque substance the author has studied the arterial system of the placenta. He found the normal placenta at term so consistently of the same arterial structure that the diagnosis of albuminuria, eclampsia and syphilis is easily made, without any other study necessary. The picture presented by the placenta is pathognomonic.

MARIO A. CASTALLO.

Peckham, C. H.: A Statistical Survey of 186 Cases of Manual Removal of the Placenta, Bull. Johns Hopkins Hosp. **56**: 224, 1935.

The incidence of manual removal of the placenta in women delivered at or near term at the Johns Hopkins Hospital from 1896 to 1933 was 1 in 120 cases. This operation was necessary much oftener in white than in black patients delivered in the clinic. It also was performed more commonly in multiparas and in women during the older age periods of their childbearing careers. The incidence of manual removal was higher following prolonged labor and was particularly common in multiparas delivered spontaneously after a long labor due to uterine inertia. Manual removal was necessary much more frequently following premature than term delivery.

Hemorrhage was the most common indication for the procedure and retention of the placenta the least common. In about one-third of the cases a previous obstetric operation with a desire to terminate promptly the third stage was the indication for manual removal.

The gross morbidity rate, excluding patients dying within forty-eight hours of delivery, was 54.95 per cent. After spontaneous delivery, and where manual removal was the only manipulation, in 48.48 per cent of the patients there followed a febrile puerperium. The gross maternal death rate was 10.75 per cent and that due to sepsis 3.23 per cent. In cases where delivery was spontaneous, the above two rates were 10.45 and 4.48 per cent, respectively.

The operation of manual removal of the placenta has its definite indications but its employment should be limited. Intelligent care of the patient during the third stage of labor will lower its incidence by preventing partial separation.

C. O. MALAND.

Rosenfeld, S. S.: The Management of Abruptio Placentae, Am. J. Surg. **21**: 279, 1933.

This condition is frequently found in association with low implantation of the placenta. The case is then characterized by the signs and symptoms of both conditions. In the author's series of 15 cases toxemia was present 12 times, eclampsia once. The hemorrhage associated with this condition is either concealed or apparent. It may remain concealed under the following conditions: (1) when there is an effusion of blood behind the placenta, its margins still remaining adherent; (2) when the placenta is completely separated while the membranes retain their attachment to the uterine wall; (3) when blood gains access to the amniotic cavity after breaking through the membranes, and the amniotic sac remains intact below; and (4) when the head is so actively applied to the lower uterine segment that the blood cannot make its way past it. The symptoms as a rule depend on the severity of the bleeding and the amount of shock. The blood pressure is usually elevated, and the urine contains albumin. In the severe cases all the signs and symptoms are marked. There is usually a sudden onset with very severe abdominal pain, a profound degree of shock, and a semicomatose or even a completely comatose state

and an extremely tender and hard ligneous, boardlike uterus. In the mild cases the fetal heart can usually be heard, and a living fetus is frequently delivered, while in the graver cases the fetal heart as a rule cannot be elicited and the infants are most frequently stillborn. Postpartum hemorrhage is a frequent complication; the prognosis is always serious.

The plan of procedure to be adopted will depend upon certain obstetrical factors. The general indications are to empty the uterus and control the hemorrhage. Transfusion, before any operative procedure is undertaken, is of paramount importance. The author generally performs cesarean section under local infiltration anesthesia.

J. T. WITHERSPOON.

Gigon, C.: Four Cases of Uterine Apoplexy, Bull. Soc. d'obst. et de gynéc. **25**: 225, 1936.

The author reports 4 cases of uterine apoplexy. He does not believe that all such cases must necessarily be treated by hysterectomy. Where the uterus can be conserved, he favors the classical cesarean section rather than the cervical one because it is simpler, it can be performed more rapidly, it has less postoperative morbidity, and also because it permits exteriorization of the uterus to verify the extent of the lesion in the uterus. In 3 of his 4 cases there was marked albuminuria.

J. P. GREENHILL.

Cathala, D.: The Treatment of Retroplacental Hemorrhage With Uterine Apoplexy, Bull. Soc. d'obst. et de gynéc. **24**: 322, 1935.

At the Maternity of the St. Louis Hospital in Paris, among 59,500 deliveries, there were 5 deaths which resulted from retroplacental hemorrhage. Three of these women died after hysterectomy, one after spontaneous labor from hemorrhage, and the other after forceps delivery from infection. During the last few years there has been an increase in abdominal deliveries for abruptio placentae in the author's clinic. However, obstetric intervention has yielded better results than hysterectomy, hence the author feels that vaginal delivery in the presence of retroplacental hemorrhage with uterine apoplexy is frequently indicated. The prognosis in these cases depends chiefly upon the state of shock which is present. The best method of intervention is that which least aggravates the shock. A destructive operation upon the child, if performed rapidly without trauma to the mother, without anesthesia or with a minimum of anesthesia, is less harmful to the mother than a hysterectomy. This is why a delivery from below frequently gives better results than an abdominal operation.

A hysterectomy after a cesarean section gives better results than a hysterectomy without previous removal of the child. Hysterectomy is the operation of choice when the cervix is not dilated or not sufficiently dilated to permit the extraction of the child whose size is reduced by a destructive operation.

J. P. GREENHILL.

Andérodias, J., and Mahon, R.: The Treatment of Placenta Previa at the Bordeaux Obstetric Clinic from 1920 to 1932, Bull. Soc. d'obst. et de gynéc. **6**: 510, 1933.

Among 11,078 labor cases at the Bordeaux Obstetric Clinic there were 59 cases of placenta previa (0.53 per cent). Of this number, 14 (24 per cent) were primiparas and 45 (76 per cent) were multiparas. In 40 cases the bleeding began during pregnancy and in the remainder after start of labor.

Up to 1927 the treatment was almost exclusively obstetric, but since that year, the low cervical cesarean section has been employed in the serious cases. Since 1932, hysterectomy has been reserved for the graver cases. In the entire series of 59 cases there was only one maternal death (1.7 per cent) and this patient died from bronchopneumonia following a Braxton Hicks version. Among the 49 patients treated obstetrically, the mortality was 2 per cent, whereas of the 10 patients treated surgically, all survived. The latter operations consisted of two classic cesarean sections, 4 cervical operations, and 4 Porro operations. The fetal mortality among the patients treated obstetrically was 51.2 per cent and for those treated by surgical means it was 50 per cent.

Not a single patient in this series was transfused. The authors consider it illogical and dangerous to perform a blood transfusion before the bleeding is checked. On the other hand, when the hemorrhage is controlled, recovery is so rapid that transfusion is unnecessary.

J. P. GREENHILL.

Reeb: The Treatment of Placenta Previa in the Strassburg Obstetric and Gynecologic Clinic From 1920 to 1932, Bull. Soc. d'obst. et de gynéc. 1: 106, 1933.

During the years 1920 to 1932 there were 101 cases of placenta previa in the Strassburg clinic among 18,307 labor cases (0.55 per cent). There were 91 multiparas and 10 primiparas. In 91 cases there were signs of labor at the time the bleeding occurred.

The treatment was obstetric in 61 cases and surgical in 35 cases. In five cases the obstetric therapy failed, so surgery was employed. Rupture of the bag of waters was performed 8 times without any maternal mortality. A rubber balloon was used 20 times with two maternal deaths. Among 11 Braxton Hicks versions there were no deaths but among the 18 versions and extractions 5 mothers succumbed. Among the 61 patients treated obstetrically, 8 mothers (13 per cent) and 35 infants (57.3 per cent) died.

Surgical treatment is divided into vaginal hysterotomy, classic cesarean section, the low cesarean section, and subtotal hysterectomy. The cervical operation is the one of choice, for it was performed 32 times since 1922 and only 1 mother and 6 infants died. The ideal anesthetic is by the spinal route.

J. P. GREENHILL.

Keller, R.: The Results of Treatment of 100 Cases of Placenta Previa Observed at the Maternité From 1920 to 1932, Bull. Soc. d'obst. et de gynéc. 1: 112, 1933.

Among 19,898 labor cases observed at the Strassburg Maternité there were 100 cases of placenta previa. Of these, 88 were delivered vaginally and 12 by cesarean section. Among those treated obstetrically the maternal mortality was 6.8 per cent and the fetal death rate was 54.5 per cent. On the other hand among the 12 cesarean sections, there were no maternal deaths and only 1 infant died. Hence, the indications for cesarean section in cases of placenta previa should be extended in the future.

J. P. GREENHILL.

Brémond: Placenta Previa and Medical Induction of Labor, Bull. Soc. d'obst. et de gynéc. 4: 364, 1933.

The method of treating placenta previa advocated is that recommended by Fournier and is as follows: Four doses of quinine are given at half hourly intervals. These are followed by eight injections of pituitary extract administered every half hour, beginning at the time of the last dose of quinine.

J. P. GREENHILL.

Laffont, A., and Fulconis, A.: Placenta Previa at the Algerian Maternity, Rev. franç. de gynéc. et d'obst. **29**: 189, 1934.

Among 11,921 labor cases at the Algerian Maternity there were 301 cases of placenta previa. Among these, 281 were treated as follows: rupture of the membranes 110 times, rupture of the membranes, bag or version without immediate extraction 95 times, internal version after complete dilatation 73 times, and the Delmas procedure 3 times. Of these 281 cases 18 women died (6.4 per cent). The causes of death were hemorrhage in 5 cases, rupture of the uterus in 7, infection in 4, embolism in 1, and shock in 1 case. Since 1924, six classical cesarean sections have been performed with two deaths and twelve cervical cesarean sections without any maternal mortality.

The authors conclude that obstetric treatment should be used in marginal cases of placenta previa especially where labor seems to progress normally after rupture of the membranes. Cesarean section should be employed where there are mechanical difficulties, abnormal presentations, large babies and contracted pelves. If after rupture of the bag of waters, the hemorrhage does not cease, or the presenting part remains high, or dilatation of the cervix does not progress, the authors likewise recommend cesarean section. They prefer the cervical operation and employ spinal anesthesia provided the blood pressure permits its use. They believe preoperative transfusion to be a very helpful procedure.

J. P. GREENHILL.

Essen-Möller, E.: Experiences and Historical View Point of the Treatment of Placenta Previa, Acta obst. et gynec. Scandinav. **13**: 195, 1934.

The author analyzes 245 cases of placenta previa. Of these, 96 (39.3 per cent) were delivered after either spontaneous or artificial rupture of the membranes, with only 1 death. Version was performed in 72 cases, with 5 deaths, and, adding 6 cases of breech presentation with 1 death, the result was 78 cases with 6 fatal issues (7.6 per cent). Thirty-three cases were dealt with by abdominal, and another 33 by vaginal cesarean section, with 1 and 3 fatal issues, respectively. Together there were 66 cases with 6.06 per cent mortality.

The results as regards the child were 29.2 per cent mortality after artificial rupture of the membranes, 64.6 per cent after version and 17.9 per cent after cesarean section. Deducting the children under 2,000 gm. and those dead before intervention, the respective figures are 9.7, 55.8, and 3.5 per cent.

Discussing the various methods, the author comes to the following conclusions. He rejects plugging of the vagina and metreurysis. In the majority of cases of lateral placenta previa, puncture of the membranes is quite sufficient. Version still maintains its place where the mother is delivered in her home, or if the child is dead; but it gives bad results as regards the child, and yet cannot give good results as regards the mother. In many cases, abdominal cesarean section is therefore justified, but the author refuses to adopt it as the method for all cases. Vaginal cesarean section may be performed in exceptional cases, for instance if infection is suspected, or if imminent danger of life makes it urgent to deliver the patient at once and that method seems the easiest way of doing so.

The author strongly insists that a patient with placenta previa should be transported to a maternity hospital as soon as possible after the appearance of the hemorrhage.

J. P. GREENHILL.

Garofalo, Agostino: A Consideration of 247 Cases of Placenta Previa, Folia gynaec.-demograph. **32**: 229, 1935.

The author reviews 247 cases of placenta previa occurring in the Clinic of Palermo from 1923 to 1934. Among the group there were 48 patients delivered by cesarean

section. After considering the manner of delivery and the higher percentage of fatalities both to mothers and babies by methods other than cesarean section, the author makes a plea for the more frequent use of this operation in cases of placenta previa.

MARIO A. CASTALLO.

Klein, S. M.: The Treatment of Placenta Previa, Monatschr. Geburtsh. u. Gynäk. **99:** 170, 1935.

At the Woronench Woman's Clinic, from 1925 to 1933, there were 59 cases of placenta previa among 11,866 labor cases. Only 9 per cent of these occurred in primiparas. Klein found that placenta previa occurred among women who had abortions ten times more frequently than among women who did not have abortions. Most of the patients delivered after artificial rupture of the membranes and Braxton Hicks version. Among the 30 women so treated, 16.1 per cent of the mothers and 79.4 per cent of the babies died. On the other hand, among 10 women delivered by classic cesarean section, no mother died but 22 per cent of the babies succumbed. Hence the author is convinced that the surgical treatment of placenta previa by cesarean section is far preferable to delivery from below. In the home, however, best results will be obtained by means of Braxton Hicks version or the insertion of a colpeurynter. After the use of these methods delivery of the child must be spontaneous in order to avoid lacerations in the cervix.

J. P. GREENHILL.

Browne, O'Donel: Methods at Present Used in the Treatment of Placenta Praevia, Irish J. M. Sc. **2:** 540, 1936.

The incidence of placenta previa is approximately one in every 150 full-term pregnancies. It occurs frequently at or before the twenty-fourth week, being the unsuspected cause of many miscarriages. The condition is diagnosed by identifying the placenta on vaginal examination. The variety of placenta previa is determined during this examination.

The author collected figures from the reports of four well-known maternity hospitals in England and Ireland. The gross maternal mortality from all causes attributable to, or associated with, placenta previa was 4.5 per cent. The gross fetal mortality in the same series was 56.5 per cent. Treatment and results in the three types are discussed. The author concludes that (1) Revision of our present treatment would improve the fetal and maternal results. (2) At the present time cesarean section is not used with sufficient frequency in the treatment of placenta previa. (3) Simple puncture of the membranes offers the best combined fetal and maternal results in lateral and marginal placenta previa. (4) Bipolar version should be reserved for the actively bleeding and exsanguinated cases, particularly when the central placenta previa is encountered in general practice.

F. L. ADAIR AND S. A. PEARL.

Correspondence

CASE OF TRIPLE PREGNANCY DIAGNOSED BY X-RAY

As pointed out in an article on this subject by Dr. Margaret B. Ballard, which appeared in the August, 1936, issue of the JOURNAL, a diagnosis of triplets before delivery is infrequent. She stated that the review of the available literature revealed only nine cases. Ballard gives a brief description of these cases, and details a case of her own. Greenhill, in a letter to the Editor, published in the November, 1936, issue of the JOURNAL, mentions a case he reported in 1923 in which the correct diagnosis was not made until the x-ray plates were re-examined after delivery.

I wish to add a case of triple pregnancy diagnosed by means of the x-ray before delivery, which occurred in my practice recently.

Mrs. I. A., white, aged twenty-five years, married four years, para 0. The family history was irrelevant. The past history of the patient was negative. There had been no multiple pregnancy in the family of the patient or the husband's family. The date of onset of her last menstrual period was March 8, 1936. The patient was first seen by me June 17, 1936. Examination at this time revealed a fundus much larger than normal at this period of pregnancy. Frequent cramplike pains were complained of. The pregnancy continued without definite trouble, rapid enlargement of the abdomen being noted, and when the seven-month period was reached, the height of the fundus corresponded to full term, the abdomen was quite tense, and marked hydramnios was present. It was not possible to palpate fetal parts or hear fetal heart sounds at this time. Multiple pregnancy or fetal anomaly was suspected, therefore an x-ray examination was requested. This was done by Dr. Isadore Lattman of the Garfield Memorial Hospital, and he reported Oct. 16, 1936, the presence of triplets. There had been a total weight gain of thirty-six pounds, blood pressure remained normal throughout pregnancy and the patient kept active. Labor began spontaneously Oct. 25, 1936, at 11:30 P.M., approximately seven weeks prematurely. There had been an escape of amniotic fluid for twenty-four hours just preceding onset of labor. The progress of the labor was rapid and under nitrous oxide anesthesia, a median perineotomy was done, and at 6:04 A.M., Oct. 26, 1936, the first baby was delivered, the position persistent R.O.P. The second bag of waters was ruptured artificially and the second baby, which was L.S.A. position, was delivered by extraction at 6:09 A.M. The third sac was now artificially ruptured, and with moderate pressure on the fundus, the occiput appeared at outlet and was delivered at 6:14 A.M. as an L.O.A. The placenta was expressed at 6:25 A.M., and the perineotomy wound sutured. The placenta was normal appearing. The cords were centrally inserted. Three amniotic sacs and one chorion were noted. All of the babies were females and weighed three pounds twelve and one-half ounces, three pounds one ounce, and three pounds twelve ounces, respectively.

The babies were given the usual premature care. Mothers' milk from wet nurses was secured, and they are, at three months of age, healthy and vigorous babies, having gained more than five pounds each. I desire to express my appreciation of the excellent care these infants received under Dr. H. H. Donnally, the pediatrist in charge of them.

E. W. TITUS, M.D.

Washington, D. C.

Items

American Board of Obstetrics and Gynecology

Practical oral-clinical, and pathological examinations for Group A and Group B applicants will be held at Atlantic City, N. J., on June 7 and 8, 1937.

An informal dinner for the Diplomates of this Board and others interested in obstetrics and gynecology will be held at the Hotel Claridge, Atlantic City, on Wednesday, June 9, 1937, at 7:00 P.M. At this time several short addresses will be made and the successful candidates of the preceding two days' examinations will be introduced in person.

Applications for the Group A examination will be received in the office of the Secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh (6), Pa., to April 9, 1937. Application blanks may be secured from the Secretary's office.

Pacific Coast Society of Obstetrics and Gynecology

The next meeting of the Pacific Coast Society of Obstetrics and Gynecology will be held in San Francisco, November 3 to 6, 1937 at the Fairmont Hotel.

American Committee on Maternal Welfare, Inc.

The American Committee on Maternal Welfare, Inc., will have a luncheon meeting at the Hotel Dennis in Atlantic City, N. J., on Wednesday, June 9, at 12:15 P.M. Short addresses will be made by Dr. Malcolm T. MacEachern, Dr. H. G. Weiskotten, and Dr. Ray Lyman Wilbur. An invitation is extended to those interested in maternal welfare activities.